PROCEEDINGS

Sixty-Second Annual Convention

OF THE

American Railway Bridge & Building Association

1957

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Proceedings of the

Sixty-Second Annual Convention

of the

American Railway
Bridge & Building
Association

Held at

CHICAGO, ILLINOIS

September 23-25, 1957

Published by the Association
Elise LaChance, Secretary
431 So. Dearborn St., Chicago 5

HALL LITHO. CO., INC. 33214

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Western Maryland, Baltimore, Md.

W. H. Huffman ..... First Vice-President
Chicago & North Western, Chicago

M. H. Dick ..... Second Vice-President
Railway Track & Structures, Chicago

B. M. Stephens ..... Third Vice-President
Texas & New Orleans, Houston, Tex.

H. D. Curie ..... Fourth Vice-President
Baltimore & Ohio, Garrett, Ind.

Elise LaChance ..... Secretary
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Past President

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R. R. Gunderson, Western Maryland ..... Baltimore, Md.

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PROCEEDINGS

The Event—The 62nd Annual Convention of the
Bridge & Building Association
The Time—September 23-25, 1957
The Place—The Conrad Hilton Hotel, Chicago

As in the past, the Bridge & Building group held their 1957 meetings concurrently with, although separately from the Roadmasters & Maintenance of Way Association.

Attendance records again surpassed those of previous non-exhibit years, the total amounting to 1,530 — 626 guests; 236 supply men and 668 railroad members.

For the convenience and information of our members, the interesting and informative addresses, as well as the six comprehensive B&B committee repors which were presented at the September convention can be found on the following pages.

Two Joint Sessions

The joint opening session of the B&B group and the Roadmasters' Association convened at 10:00 a.m. After brief words of welcome, members heard addresses by D. W. Brosnan, vice-pres. oper. of the Southern, and G. M. Magee, director of engineering research of the Association of American Railroads.

On Tuesday afternoon, these two groups again met to hear words from W. A. Grotz, president of the Western Maryland and Donald M. Smith, regional director of the Railroad Retirement Board.

A question and answer period also took place. This interesting discussion was moderated by E. L. Anderson, asst. to vice-president operations of the Frisco.

Separate B & B Sessions

Presiding over these separate meetings was R. R. Gunderson, president of the B & B group. Committee reports of the following subjects were present:

What Should the Supervisor Expect from Management and Vice Versa?

Maintenance of Automotive and Maintenance of Way Equipment.

Mechanization, Tools and Equipment.

Branch Line Bridges and Buildings and their Maintenance.

Utilities of Ready-Mixed, Precast and Prestressed Concrete in B&B Work.

Let the Motto be Always Safety First.

Also heard at these separate sessions were addresses by W. E. Chapman, chief engineer maintenance of the Central of Georgia, and J. N. Todd, engineer consultant of the Cox & Stevens Electronic Scale Division, Revere Corporation of America.

A motion picture, narrated by Mr. R. L. Fox, process engineer of the Southern was also another interesting highlight of this group's separate sessions.

Remarks by President Gunderson

In addition to taking charge of routine business affairs, Mr. Gunderson had the following comments to make:

I am impressed by the appearance of two distinct groups who have shared in the affairs of this Convention, the young and the more seasoned. Those of you who by age or circumstance are here for the first time may leave with the impression that many radically new products or methods are only now being discovered.

Many of us have lived with these developments and I think many of the bugs that are inherent in new things have been removed by our experiences. In a very real sense, I feel that many of our more seasoned members have been pioneers. I think we are all fortunate that they so generously share that experience by their work on Committee reports, by their discussions from the floor, and by their free discussions when approached elsewhere these past few days. Many of these experienced men will conduct the affairs of this Association in the years ahead. I feel confident they will carry this responsibility as they do their everyday jobs and that they will exercise the same high level of judgment.

However, we look upon you who are new and possibly younger, to furnish the muscle and assume the responsibilities of our profession and association as rapidly as your

abilities and opportunities permit. This, I offer as a challenge to you.

I also challenge you to not accept the accomplishments of today as the ultimate. Some pioneering has been done. You have several good working tools. You have the benefit of our experiences to guide you. You have the responsibility of questioning why and using your intelligence and ability to go on and make our developments appear primitive.

I feel confident that this Association will continue as a medium where practical men will gather and share their accomplishments. Our managements have faith in us. It is your responsibility to justify that faith. Your problems will make ours appear insignificant. You can best solve them by active participation in an Association that is dedicated to the solution of these problems confronting the practical man.

The new subjects selected, on which committee reports will be based and presented at the 1958 convention are as follows:

Housing Problems of Bridge and Building Forces.

Trends in Trestle Design and Construction.

B&B Forces and the Federal Highway Progress.

Dieselization and the Water Service Man.

Attracting and Training B&B People.

Extended Service Life for Masonry Structures.

In the election of officers, W. H. Huffman, assistant chief engineer, C & NW, Chicago, was advanced from 1st vice-president to president; M. H. Dick, editor of Railway Track & Structures, Chicago, was advanced from 2nd to 1st vice-president; B. M. Stephans, assistant to the executive vice-president, T&NO, Houston, Tex., was advanced from 3rd to 2nd vice-president; and H. D. Curie, master carpenter, B&O, Garrett, Ind., was advanced from 4th to 3rd vice-president. The position of 4th vice-president was abolished. L. C. Winkelhaus, architectural engineer (ret.), C&NW, at Chicago, was re-elected treasurer.

New directors elected were G. W. Benson, division engineer, C of Ga., Macon, Ga. (reappointed for a 1-yr term) and W. H. Bunge, assistant engineer, MP, St. Louis, Mo., and E. R. Schlaf, assistant superintendent of water service, IC, Chicago (both reappointed to serve 3-yr terms.)

REPORT OF THE NECROLOGY COMMITTEE

TO THE PRESIDENT AND MEMBERS OF THE AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION:

We regret to advise that we have learned of the loss of nine (9) members through death during the year. It is possible that other members have passed away during the year of which we have no information. If you know of any, we would like to have their names to include in the list to be printed in the Annual Proceedings. The following have been reported:

NAME	TITLE-RAILROAD	DATE JOINED	DATE DIED
Active Members			
John Ebbens	Supervisor B&B Chicago & Western Indiana Chicago, Ill.	1947	October, 1956
P. F. McNally	B&B Carpenter Southern Pacific Co., Ogden, Utah	1948	December, 1955
J. S. Peden	Water Service Supervisor Texas & Pacific, Big Spring, Texas	1953	In 1957
J. H. Robertson	Assistant Engineer Missouri Pacific Lines, Houston, Texas	1953	In 1957
Associate Members			
George H. Redding	President Massey Concrete Products Co., Chicago, Ill.	1946	November 23, 1956

Life Members

Charles Eisele (Ret.)	Asst. Engineer New York Central Cleveland, Ohio	1930	Died in 1956
L. D. Garis (Ret.)	General Bridge Inspector Chicago and North Western, Chicago, Ill.	1930	Died in 1957
H. A. Gerst (Ret.)	Asst. Engineer Great Northern Ry., St. Paul, Minn.	1917	Died in 1956
M. J. Flynn (Ret.)	Supervisor B&B Chicago and North Western, Chicago, Ill.	1905	Died in Sept., 1957

We deeply regret the passing of these, our fellow members. May we stand a moment in silence to honor these departed members.

Respectfully submitted,
H. D. CURIE, *Chairman*
J. M. LOWRY,
Necrology Committee

SECRETARY'S REPORT

ANNUAL REPORT OF MEMBERSHIP FOR PERIOD SEPTEMBER 20, 1956 TO SEPTEMBER 20, 1957

ACTIVE MEMBERSHIP:		
Total Active Members, September 20, 1956		507
Reinstated—Paid back dues		8
New Active Members since September, 1956		112
		627
LESS—Members reported deceased	4	
Resigned account retirement, etc.	9	
Transferred to Life Membership	5	
Dropped a/c did not pay dues (1955)	23	41
TOTAL ACTIVE MEMBERS, SEPTEMBER 20, 1957		586
ASSOCIATE MEMBERS:		
Total Associate Members, September 20, 1956		72
New Associate Members since September, 1956		32
Reinstated—Paid back dues		2
		106
LESS—Reported deceased	1	
Resigned	4	
Dropped a/c did not pay dues	3	8
TOTAL ASSOCIATE MEMBERS, SEPTEMBER 20, 1957		98
LIFE MEMBERS:		
Total Life Members, September 20, 1956		73
Transferred from Active Membership		5
		78
LESS—Reported deceased		2
TOTAL LIFE MEMBERS, SEPTEMBER 20, 1957		76
HONORARY MEMBERS:		
Total Honorary Members		9
TOTAL MEMBERSHIP—ALL CLASSES—SEPTEMBER 20, 1957		769

September 20, 1957-EL

TREASURER'S REPORT

SEPTEMBER 1, 1956 TO AUGUST 31, 1957

Cash Balance—September 1, 1956		$3,676.19
RECEIPTS:		
Dues	$2,889.10	
Advertising		
1955 Proceedings	455.00	
1956 Proceedings	1,921.27	
Refund from Roadmasters and Maintenance of Way Assoc. for Ladies Luncheon 1956 Convention	305.59	5,570.96
Total Receipts		$9,247.15
DISBURSEMENTS:		
Salaries (Secretary and Assistant)	$1,503.20	
Social Security and Withholding Tax	308.00	
Stationery and Printing	382.05	
Postage	144.00	
Office Rent and Telephone	324.80	
Proceedings (1956 Edition)	2,337.04	
1956 Convention Expense	673.14	
Office Supplies	41.81	
Addressograph Plates	40.17	
Embossing Membership Certificates	86.06	
Office Equipment	17.46	
Miscellaneous	77.96	5,935.69
Cash on Hand (August 31, 1957)		$3,311.46
BALANCE:		
First National Bank of Chicago, August 31, 1957		$3.332.76
Less—Outstanding Checks		21.30
		$3,311.46

L. C. WINKELHAUS,
Treasurer

September 6, 1957

APPROVED:
LEE MAYFIELD, Chairman
R. E. DOVE
R. P. LUCK,
Auditing Committee

REPORT OF AUDITING COMMITTEE

TO MEMBERS OF THE
AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION:

Gentlemen:

The undersigned have examined the books of the Secretary and report of the Treasurer for the period from September 1, 1956 to August 31, 1957, inclusive, and have found them to be correct as of the latter date.

Respectfully submitted,
LEE MAYFIELD, *Chairman*
R. E. DOVE
R. P. LUCK, *Auditing Committee*

September 6, 1957

REPORT OF RESOLUTIONS COMMITTEE

The American Railway Bridge & Building Association, in convention assembled, recognizing that the special efforts of certain parties should be fittingly acknowledged, does hereby recommend the following resolutions, to wit:

Be it resolved that the appreciation of the officers, members and guests of this Association be expressed to the management and personnel of the Conrad Hilton Hotel for the co-operation and hospitality we have enjoyed.

Be it further resolved that the sincere thanks of the officers and members of this Association be extended to the Simmons Boardman Publishing Corporation and its representatives. Their assistance and interest have been invaluable.

Be it further resolved that the sincere appreciation and thanks of the officers, members and guests of this Association be extended to the officers and members of the Bridge & Building Supply Men's Association and to the Track Supply Association. Their untiring and devoted support of our Association at the convention and throughout the year is a vital factor in the success of our efforts. The banquet and entertainment is a bright spot in the year.

Be it further resolved that the sincere appreciation and thanks of this Association be extended to Mr. W. A. Grotz, President, Western Maryland Railway; Mr. Donald L. Smith, Regional Director, Railroad Retirement Board, Chicago, Ill.; Mr. E. L. Anderson, Assistant to Vice President-Operation, Frisco Railroad; Mr. D. W. Brosnan, Vice President Operation, Southern Railway; and Mr. R. L. Fox, Process Engineer of Structures, Southern Railway.

Be it further resolved that the appreciation and thanks of the officers and members of this Association be extended to Mr. G. M. Magee, Director Engineering Research, A.A. R.; Mr. W. E. Chapman, Chief Engineer-Maintenance, Central of Georgia.

Your Resolutions Committee recommends that these resolves be spread upon the Minutes of the Convention so they may become a part of our Annual Proceedings and that copies of these resolves be forwarded to the parties concerned.

W. H. BUNGE, *Chairman*
H. M. HARLOW
E. R. SCHLAF,
Resolutions Committee

Presented Below Are Two Major Addresses by Messrs. Chapman and Todd Which Were Delivered Before the Separate Sessions of the Bridge & Building Association

On Monday afternoon, September 23, W. E. Chapman, chief engineer-maintenance of the Central of Georgia at Savannah, Ga., had the following remarks to make on "Blueprint for Total B&B Mechanization."

It is a pleasure and a privilege to be with you today and to have an opportunity to speak to this fine organization. Its members are the main-springs of the Bridge and Building activities of our various carriers, and have, accomplished many worthy things in a faithful and proficient manner and will, in the future, accomplish even greater and more startling achievements.

In developing the Blue Print for Total Bridge and Building Mechanization the World War II motto of, "Difficult things are done immediately, but the impossible takes a little longer," appealed to me very strongly, and I think that we should keep it in mind as we face the challenge of the next few years in our work.

Even as our armed forces are now broken down into smaller combat units, motorized, mechanized and made into hard-hitting, fast moving, flexible units, so it is necessary, in this age of high cost of labor and material, to organize, motorize and mechanize our Bridge and Building forces into flexible, hard working, fast moving, mechanized units in order to keep the cost of necessary repairs to a minimum.

As our imaginations are stimulated and we turn from the past and begin "to explore the horizons of the future" in our line of work, the impossible which takes a little longer will become a reality.

In describing hereafter the equipment and methods found to be very efficient and economical by the Central of Georgia and other roads, and later describing equipment which, in my opinion, when manufactured, will be an approach to the ultimate in Bridge and Building equipment, it is hoped that the imaginations of this fine group will be stimulated to the point, that even better equipment and methods will evolve.

Inspection & Scheduling

Of primary importance, is an accurate, factual inspection of facilities to determine just what must be done the following year to keep the various structures in good condition.

This inspection is the basis for requisitions for necessary material, scheduling of forces and application for maintenance allotments for the following year.

The complete reports, together with requisitions for materials are forwarded to headquarters not later than August 15. These reports are then consolidated as to different sizes and types of material and schedules of work days, or parts thereof, for each trestle or structure are prepared. In this manner an accurate estimate of labor and material needed for the following year is made.

Requisitions are then submitted to the purchasing department, with dates material will be needed shown thereon, so that necessary material can be procured and distributed on schedule.

Material Distribution

The material is assembled at treating plants on schedule and that for each structure is listed and bundled separately. When notified, the treating plant loads these bundles of material, each marked prominently with its designated trestle number. In this manner the material for first trestle reached by train (local freight when available, otherwise a work train), will be the top bundle or bundles. Then the next bundle or bundles to the second trestle, and so on.

These bundles of material are unloaded at each structure by a crane or hoist, under supervision of the Bridge and Building Supervisor.

The material is scheduled to be on the site of the work in advance of the arrival of the gang to do the work.

Housing & Camp Sites

The forces to do the work, housed in mobile, self-contained, highway trailers for maximum flexibility and efficiency, are then brought in. They are provided with schedule of work to be done, showing how much time will be needed at each structure, and all other necessary information.

Generally the forces are camped at some central location convenient to the work to be done for one week. They are transported to and from site of the work on truck or hoist.

If several days' work is lined up for a single structure, the camp site is located at or conveniently near that structure.

In some instances work may be completed on several trestles or structures during one day, and in order to effect maximum efficiency the trailers and camp sites are moved daily.

Such flexible, mobile, self-contained outfits are a necessity in order to secure maximum use of such gangs.

Radio & Protection

All work is done under the protection of what is known as a "Y" order, where trains are required to halt at stop boards each side of trestle unless they are notified to proceed by the foreman of the gang by radio or in person.

The dual radio set, with a tall antenna is placed at one end of relatively short trestles or on motor cars on long trestles and the foreman is provided with a Handie-Talkie also, in case he is away from the structure on motor car.

In this way, the foreman can keep in touch with approaching trains, talking them to the structure, and work right up to the last minute, thus increasing productive time.

Gang Organization

The tools are integrated into standard gangs, composed of from 1 foreman and 3 men to as large gangs as are needed.

Work Equipment With Each Gang Timber Trestle Gangs

1—2½ Ton heavy duty truck with winch in back.

1—Self propelled, 4 wheel drive, 4 wheel steering, hoist with hydraulic controls throughout, 4 hydraulic outriggers, retractable railroad guide wheels, dual cable hoisting attachment, a telescope boom to extend 37′ and rotating through 360 degrees, a 7½ ton winch and operates on rail or highway, at speed of 20 M. P. H.

1—Hydraulic Power Pack, providing power for operation of hydraulic driven jack

group, jack beams and bridge scaffold, which are used primarily for renewing bridge caps and stringers, also hydraulic drift bolt puller, hydraulic bolt cutter, hydraulic tool for pulling piles and braces in line, and hydraulic liner for lining track on the structure.

1—Bridge deck machine, self propelled, providing power for boring, driving bolts, spikes, lag screws, and for propelling saws and impact wrenches.

Steel Bridge Gangs

1—2½ Ton heavy duty truck with winch in back.

1—Bridge greasing or painting machine, self propelled, with retractable guide wheels, equipped to handle spider staging, equipped with three (3) sets of power sprays for spraying tie coating, bridge grease or paint.

1—Stone distributing cart.

1—Set spider staging.

1—Air compressor and air operated tools necessary in steel work.

The steel bridge gangs greases or paints structures and sprays decks in the summer and makes necessary repairs in the winter.

In addition to the above, at some central point, there is set up a saw mill for sawing suitable recovered bridge timbers into framing or other timbers. All timbers removed that will do for sawing into framing timbers etc. are banded and picked up by crane on a local freight or work train and sent to the central point for sawing.

Building & Painting Work

A 2½ ton heavy duty truck, with cab protected from spray, having a hydraulic aerial beam that carries two men up, out, over or down. Actually it is composed of a pair of independently moved beams installed on a revolving mast with enclosures for operators attached to the outer beam. The two beams, when not in use, collapse on each other and both go down on truck. The work enclosures have the bottoms horizontal to the ground, regardless of the position of the beams. The truck has hydraulic outriggers to provide stability. The aerial beam has a reach of 48 feet and the truck is equipped with spray outfits for outside and inside paint and for roof coating. All overhead structures hence can be painted without scaffoldings. The truck also has compartment sections carrying other small B&B tools.

Economies of Above Equipment

The savings to be derived by the above mechanization will be found in increased productivity. It is best illustrated, and is comparable to the savings shown, by two bridge painting jobs on which accurate cost records were kept. First job on this bridge was done several years ago and, at the then prevailing prices, cost, for labor and material, $46,200. The last job done recently by spraying with grease at current prices, cost, for labor and material, $12,960.

Proposed Equipment

1—2½ ton heavy duty truck, with retractable rail guide wheels, outriggers, rail dogs, compartment sections for tools, hydraulic aerial beam reaching 48 feet, which will handle spider staging, built in stone distributor, and with grease machine on the bed of truck, and with winch on rear of truck. This will combine the truck, winch, greaser, stone cart and air compressor for bridge tools, as the air compressor on the greasing machine is to be powerful enough to operate air tools necessary in steel work.

This will eliminate 1 power unit on individual air compressor and on the separate aerial boom, as well as one truck for smaller roads. This will also eliminate rail wheels and trucks etc. on the stone cart and air compressor.

Also,

1—2½ ton heavy duty truck, with retractable rail guide wheels, outriggers, rail dogs, telescope boom to handle heaviest members of 35 feet radius, rotating through 360 degrees, dual cable hoisting attachment, winch on rear of truck, hydraulic power pack in truck for providing power for operation of boom, listed hydraulic tools and also bridge deck machine tools. This will eliminate the power plant and frame on hydraulic hoist and on the bridge deck machine and the rail wheels, axles, etc. on the bridge deck machine and hydraulic power pack.

To carry out the provisions of this blue print requires:

(1) Continued exploring of the frontiers of the future.

(2) Factual inspection for annual replacements.

(3) Mechanical distribution of material.

(4) Scheduling of labor forces.

(5) Mobile trailers for moving forces.

(6) Radio for securing maximum productive time.

(7) Acquiring and using best equipment.
(8) Recovering and sawing all suitable old timbers for other uses.

It is hoped that this talk will stimulate all of our imaginations and that the end result will be more and better Bridge and Building Maintenance Methods and Equipment. I am sure that you will be equal to that challenge.

Remarks by J. N. Todd

On Tuesday morning, September 24, J. N. Todd, engineer consultant of the Revere Corporation of America at Wallingford, Conn., spoke on Problems in Maintenance of Motion Weighing Track Scales. His address is given below:

The method of handling this assignment is slightly different from that usually followed by committees of our Association but it is one that we hope will meet the requirements of the convention. Motion weighing of freight cars is not new, a mechanical device having been originated more than half a century ago. I am told that the idea was developed by two men from Texas, probably big men, and I suppose our Texas members are not surprised that something new and clever came out of that great state. Without giving a detailed description of the device, it provided that a car moving across a scale would trip a lever and its weight would be printed on a tape. The basic principle, while improved over the years, has not been changed greatly and, known as an automatic recorder, it is still in use at railroad yards and coal mines. In fact its use spread over the country within a few years after it was introduced. But some railroads for a long time confined its use to coarse commodities, such as coal, sand and stone, for which there is a more liberal tolerance in the tariff than for other commodities in closed cars.

More recently there has come into use the so-called electronic scale, well adapted to rapid motion weighing. To some people the name "electronic" in this connection is a misnomer but since an important part of the equipment is electronic and the name has caught on with the public we will continue to use it here. While it is relatively new in the railroad field, having been used for carload weighing only about seven or eight years, the basic principle has been in use since the early part of World War II for weighing airplanes and for determining the center of gravity, particularly of cargo planes. That equipment is handy and portable, and can be set up on any hangar or ramp where planes are standing. It filled an urgent need in wartime and has been in widespread use since then.

A technical description of railroad electronic weighing need not be given at this time for several very good reasons. One reason is that in my opinion a convention of electrical specialists would be a better place to give such a description, and it would also be a better place to find someone capable of giving it. However, I can spend a few moments describing the main points as I see them. First there is the load cell in the pit which receives the load from the track above it, and by means of electric cables, transmits the information to the instruments in the weighhouse. They in turn show by a dial and a printer the weight of the load applied to the cell. The load cell has in it, as its main component, several steel load supporting columns with resistance wire strain gages cemented to their sides. I am sure none of you need to be told that steel like most all matter is elastic and is compressible. When load is applied the column is compressed ever so slightly. A basic law of physics is to the effect that the amount of compression of the steel is proportional to the load applied to it, and within the elastic limit the column will return to its original shape when the load is removed. We cannot see the amount of the compression of the column but the strain gages can detect it extremely accurately, and this information is transmitted electrically to the instruments in the house where, in turn, it is translated into pounds. Thus an unknown weight passes over the cell with the instrument telling you almost instantly the magnitude of that weight.

There you have an over-simplified picture of electronic weighing but one which should give a rough idea of what takes place. Any more detail would take a lot of time. This method of weighing together with the mechanical recorder referred to previously comprise practically all of the motion weighing being done today. While the electronic scale is fairly new, its use is spreading and it appeals especially to management because of the increased speed at which motion weighing can be accomplished without sacrificing accuracy. It is, therefore, a natural for the modern high speed pushbutton type of yards.

Motion weighing has its place in yards, especially big yards where a lot of cars are handled. If the scale is located in the direct line of switching it will be subjected to a lot of abuse. For this reason, it should be built

to stand the abuse or it will be broken down frequently and be costly to maintain. Forty or fifty years ago only a few railroads spent much money on scales and their motion weighing scales were outstanding for rugged and passive construction. Not only the concrete pits but the structural steel was designed to much greater strength than required by ordinary bridge design practices. Also, the scale mechanism was selected for a capacity much beyond the actual loads to be weighed. As a consequence, those scales went for years without heavy repairs. The reason for greater strength and more material was not due to the actual load at any one time but the constant repetition of loads, the around the clock pounding of wheels and the passage of yard engines. While a few roads were setting this fine example, most of them were treating scales as something of little importance. Such scales as they installed were barely adequate for the loads of the moment and as a consequence were soon obsolete because of the increasing length and capacity of cars to be weighed. Some of these scales we still have with us and they are problems to maintain.

Today almost every railroad building a new yard or improving an old one builds scales of adequate length and capacity. In recent years railroad men have exchanged information and they have visited one another's installations and they have benefited through personal contact with men from other railroads at conventions such as this. It has been my observation that railroads benefit greatly from having their officers and men attend conventions and participate in association work. Today the railroads are more enlightened than ever before and their standards of construction and maintenance are much improved and more standardized.

The subject assigned to us is "Problems in Maintenance of Motion Weighing Track Scales." The Executive Committee has very generously allowed us considerable latitude in handling the subject but it seems to me that we could get a little closer to our assignment by referring to the construction features of the principal types of motion weighing track scales. As I see it, there are three general types in use today. The first might be called the conventional type because it has been in use the longest. It is either the usual knife edge lever scale or a plate fulcrum scale installed on a grade, at or near a hump and having a mechanical recorder. The second and third types are electronic scales and for their designation I would like to refer to American Railway Engineering Association reports for 1954 when the scale subcommittee made its first report on this subject. In that report they were arbitrarily divided into straight electronic or load cell scales without levers, and combination electronic which means load cells and lever scales in the same pit with the same weighbridge. There is nothing official about the two names given but they seem to be as descriptive as any and they have not been disputed.

The construction of the straight electronic scale is much simpler than that of the conventional scale. The length, width and depth of the pit are all less, and less steel is required. Altogether the straight electronic scale is about one-fourth cheaper to build than a conventional scale of the same length weigh rail, mainly because of the smaller quantities of steel and concrete required.

The combination electronic scale, one having load cells and a lever scale in the same pit, is one I venture to say will not be met with very often in future installations. This statement is made because of the greater confidence in the new device gained through several years use of the straight electronic scale by the railroad industry. The combination scales now in use were installed by those pioneering railroads which were the first users of electronic scales and they cannot be criticised for taking precautions in those early days. The principal constructional feature of this scale is that it requires a deeper pit than a conventional scale of the same length. Also, in the case of a knife edge scale on a grade, more structural steel is required for a subframe. It is estimated that a combination lever and electronic scale would cost about 25 per cent to 30 per cent more than a conventional scale of the same length.

Maintenance of mechanical scales is by now a fairly routine operation with the railroads. However, all major railroads today are staffed with scale inspectors, scale cars and test cars as required depending upon the number of scales on the line. The importance of accurate weights is well recognized, and so it follows that adequate maintenance must be, and in most cases is being, provided by railroad management.

Due to constant pounding of cars and sometimes engines over the scale, it is obvious that considerably more maintenance is required on a motion weighing scale than on those lever systems used only for static weighing. It has been my experience that

accuracy and sensitivity must be checked more often than the normal quarterly period and that major overhauls are also required more frequently.

Mechanical recorders used with these systems have been furnished on a rental basis only and the manufacturer has provided maintenance as a part of his contract. This has normally included routine inspections and servicing, scheduled to coincide with the railroad scale inspector's calls, as well as emergency service when required.

In the early days of the electronic scale, maintenance was quite a problem, but with the increasing use of this type of equipment as well as electronics in general, several satisfactory maintenance arrangements have now been established.

In the first place, at least one manufacturer is now providing the first year's maintenance as part of the purchase price of the scale to assure optimum care while permanent arrangements, including necessary training of personnel, are being established. Following that, various systems have been adopted with equal success.

At least one national electronic organization has been trained and equipped to give service on an annual contract basis. This offers a schedule of routine preventive maintenance calls as well as complete emergency service as requested. In other instances, the railroads have assigned the electronic scale maintenance to their own communications or signal department to take advantage of the basic skills of that group. This, of course, has required close cooperation between those people and the scale inspectors.

Probably most railroads would prefer to retain all scale maintenance under the scale inspectors but this has posed the rather formidable problem of making electronic technicians out of scale mechanics. However, with the help of training courses offered by the manufacturers, this has been successfully accomplished in many cases. To further provide for maintenance by the scale inspectors, recent models of electronic scales have come out with plug-in assemblies to greatly simplify servicing. With such equipment, the scale can be put back into service without delay and the actual trouble can be located and corrected in a shop equipped for the work at the convenience of the repairman. Also, if the problem is beyond the scope of the repairman, the assembly can be returned to the manufacturer for repairs without interfering with normal scale use.

Due to the inherent inaccuracies of weighing cars in motion, any type scale in this service must be maintained in the best possible condition to minimize inaccuracies due to the weighing equipment. The cost of this additional maintenance, however, is negligible when considered along side the tremendous savings realized by eliminating the special handling that is required to spot weigh cars statically. To say motion weighing saves nine-tenths the cost of static weighing is a conservative estimate.

Mr. President, that concludes my report.

Discussion

When J. A. Jorlett (PRR) asked for a comparison of the cost between the electronic and the fulcrum type scale, Mr. Todd stated that basically the plate fulcrum scale is more expensive than the electronic one of the same function. The plate fulcrum scales require long pits and lots of steel, which adds to the cost.

T. M. von Sprecken (Sou) asked how much of a job it would be to remove an electronic cell. Mr. Todd replied that it was not much of a job. But did require the jacking up of a girder, the removal of a unit and disconnecting the cables after which you can just walk off with it.

W. S. Broome (C&S) asked how many of the electronic scales were struck by lightening like the one at Houston was. Mr. Todd stated that the one at Houston is the only one to his knowledge which was struck by lightening. The newer electronic cells, he said, now bleed off electric accumulations to the ground. Hence, grounding is necessary where it is likely to be charged with ground currents.

When E. T. Franzen (CRI&P) asked how long a car must be on the scale to obtain the proper weight, Mr. Tood replied three seconds. In reply to a question by E. R. Simmons (SLSW) relative to the maintenance cost of the electronic scales, Mr. Todd replied that the electronic scale is cleaned periodically to avoid electric shorting. The cell, he said, should last indefinitely as it is all sealed in.

J. M. Lowry (SLSW) asked how close to the scale must the scale house be located. Mr. Todd replied that the scale house can be any place but its best position would be near the head of the scale so that the scale man can see the tare weight stenciled on the car.

J. A. Jorlett (PRR) stated that he had read a story where a railroad had used a stepped up rail to raise a car so that it

would be uncoupled to adjacent cars. Mr. Todd stated that this is purely experimental at this stage. It is a method of trying to weigh two cars in motion by raising the car so the weight will not be affected by the couplers. He understands that, when this work is sufficiently advanced so that the manufacturer is satisfied that it will work, they will call in weighing inspectors for their approval.

Abstracts of Addresses by Messrs. Brosnan, Grotz, Magee and Smith as Delivered Before the Two Joint Session are Presented Below

During the morning joint session on Monday, September 23, D. W. Brosnan, vice-president, operation, of the Southern spoke on "Facing the Facts." He had the following comments to make:

"In our industry there is a great deal of lethargy at all levels," Mr. Brosnan said, "far too many railroad officers, from presidents down and supervisors up, are content with the status quo. This attitude seems to say: 'Let's preserve things as they are; any change looks like work and will likely interfere with a complacent mind and way of life. If change is to come it can come after we are gone; we should finish our days in comfort.'

Change of Attitude Needed

"This attitude by a too large segment of supervisory and management people is one great curse of our industry. We have gotten by with it . . . but it is now running out of gas and our industry will fail unless such attitudes are promptly changed."

"Competition is the spur" that has brought the need for changes in old attitudes, he said, to the end that the railroads will be able to offer better service at lower costs. Then he got down to specific terms:

"For low prices, or rates, higher productivity must be had from money expended for both labor and materials. It is the duty of supervisory personnel and management to do the needed straightforward thinking, to find methods and means of reducing costs and at the same time improving services. When supplied, the facilities must be properly used as planned—this is largely your duty and is in your hands.

"Many railroads are today using obsolete plants, plans, and organizations in this technologic age. It is axiomatic that those who stand still are left behind in any procession. To keep up, and especially to walk at the front, is a challenge worthy of the best in you men. There is no room for lethargy, for contentment, for 'can't do' attitudes, or for passing the buck.

Must Take the Initiative

"All too often I have heard it said by people in supervisory places that top management won't provide the money or agree to changes. Be that as it may, I am convinced that most often supervisory people — you folks and your opposite numbers in Transportation and Maintenance of Equipment — fail to ask for — insist upon — and courageously explain your plans.

"Why is it needed and what will it produce? To have a good conscience about doing your part be certain that you move with vigor and imagination in studying and presenting plans — then when the improvement is made or the change effected, get behind it with all of your moral and physical stamina to make it work as planned."

Then came these suggestions for soul searching on the part of the audience: "Are you a do'er or a drone? Do you believe in a better present for your company, for yourself and your fellow officers and employees? Are you willing to stand up and press boldly for an ever larger participation in the future of this country? These things can be had. They will come to those men and companies who will prepare for them and then take them.

"Let us face this fact. What is being done is not nearly adequate. Energy, thought, courage and self-dedication are essential to success. You can afford to do no less."

Following Mr. Brosnan that morning, G. M. Magee, director of engineering research, AAR remarks dealt with "How Does AAR Research Help Track & Bridge & Building Men."

Our staff specialist on concrete has worked with the Portland Cement Association in conducting training courses on various railroads on how to make good concrete. Perhaps you have attended one of these courses. If not, you might like to have one arranged for on your railway. He has also been investigating instances of concrete deterioration on various railroads, with the objective of correcting those faults which have led in some cases to

early failure. He would welcome the opportunity to inspect any concrete on your railway that may be giving you trouble. Also, we are participating in the work of the Reinforced Concrete Research Council of the Engineering Foundation and copies of the reports of the council are furnished all railroads for their information. Of particular interest and value to you in the work of the council, is the exposure tests at Treat Island which have shown the excellent durability results obtained with air entrainment in the concrete.

The total length of wood bridges and trestles in the United States is approximately 1,850 miles. This entails a big maintenance job. We have completed laboratory tests for fasteners for sway bracing which against decay and means to increase the bearing should help you in keeping these connections right. We have been working for several years with paint manufacturers to develop a fire-retardant coating that can be economically applied to timber structures to eliminate the fire hazard. Although considerable progress has been made we are hopeful that further improvement in coating materials can be effected.

Several railroads have rule-of-thumb to renew any stringers over 40 years old. With facilities provided in our new Engineering Laboratory we will make fatigue tests on 40-year-old stringers to determine their strength relative to new stringers.

Our research program also includes a study of means to treat the cut-off ends of piling to protect against decay and means to increase the bearing strength of caps and the ends of stringers.

High-Strength Bolts Prove Up

Some of our research work should be of value to you in the maintenance of steel spans. The work of the Research Council on Riveted and Bolted Joints, in which we participate, show that high-strength bolts have better fatigue strength properties and better resist loosening under vibration than rivets. Specifications are available for the purchase of the bolts and hardened washers and a recommended practice for their application.

If you have a problem with loose eye-bars, you will find the method of shortening them by the acetylene torch and clamp method to be very convenient and laboratory tests have shown the strength of the eye-bar is not impaired thereby. A detailed description of this method and its application is available if you are interested.

Painting of steel spans is a time-consuming job. We have participated in the work of the Steel Structures Painting Council. This council has issued two manuals which contain much helpful information on cleaning and painting steel structures. Volume 1 is titled "Good Painting Practice" and Volume 2 is titled "Systems and Specifications." Copies may be obtained from the council at 4400 Fifth Avenue, Pittsburgh 13, Pennsylvania.

Another practical problem that the bridge and building man sometimes encounters is to decide whether or not an end post on a truss, that has been bent by a derailment or a misplaced load, is safe for continued train operation. In cooperation with the Army Engineers, Bureau of Public Roads, and others, a model truss span is now being erected at Northwestern University with which facility information will be obtained on such matters as bent end posts, etc.

At the afternoon session on Tuesday, September 24, forward thinking as a method of solving the railroads' problems was counseled by W. Arthur Grotz, president of the Western Maryland, in an address before another joint session of the two associations. While short-term planning is done in considerable detail, what is needed today is more long-range planning, he declared. Such planning "would provide the overall framework into which the short-term plan — the individual new yard or CTC, the financing and dividends, public relations and personnel development — should fit. A long-range plan would state the goals, the philosophy or creed, would set target dates for programmed actions, and would furnish measures for testing accomplishments."

Mr. Grotz believes that long-range planning involves getting answers to such questions as: "What does your management want your company to be in 1970, in terms of service, facilities, position in the whole transportation field, gross revenues, net earnings, balance sheet and organization? How can it get them? Can a road map be prepared? Certainly it should get there more surely with a plan, however imperfect, than without one."

He believes, further, that "every effort to think objectively and not wishfully about the company's future and to write down specific plans and dates will challenge and bring out the best in management."

Mr. Grotz also had something to say about the "management concept" of supervision.

This means, he said, "that a man is not a supervisor because he knows how to operate a particular machine better than anyone else, or is the best draftsman, or happens to have likable personal characteristics, but because he has a special ability or training to appraise people and their performance, to coach and lead them.

"As supervisor, he is not to do his men's work but to get them to do it, and to make sure that they do it effectively. He may have a production job of his own to perform, as does a playing manager on a ball team, but it is distinct from and in addition to supervision. He must see that performance is recognized and convey his interest in the individuals who have performed so well."

Following Mr. Grotz that afternoon, D. M. Smith, regional director of the Railroad Retirement Board spoke on "The Unseen Labor Force & What You Can Do About It."

What is the unseen labor force? Suppose you are working a 30-man extra gang. Twenty of these men were previously employed in the railroad industry; ten were not. There are ten men who have had railroad experience who could fill those jobs but they were not hired. They are the unseen labor force that I am talking about. They are the ten people, railroad employees with railroad experience, who could have filled ten jobs filled by non-railroad employees. This unseen force, who was not hired, cost the railroads a lot of money.

Thus it would become evident that those men who had no previous railroad experience, would have to be very productive, indeed, to make up for the cost differential in favor of using the men with railroad experience.

The cost of this unseen labor force that is frequently attached to every gang that is worked is high but some things can be done to reduce it. The answer is sort of implied in the illustration: Hire available railroad employees when you can to fill railroad jobs.

I will grant you that your problem may frequently be that the cost of this unseen labor and the savings that you will make by reducing it does not appear on the books of account by which your job performance is measured. You are held to getting your work done in the least possible time at the least possible expense. Some times it is difficult to do that and make use of experienced railroad employees.

At the present, top management is realizing the cost of unemployment and importance of reducing them.

It is not always easy to hire available railroad employees. They are not always poised on the threshold of the railroad Retirement Board's office, ready to take off at a moment's notice for a job wherever it may be. It is difficult, but if by working together we can make adequate arrangements they can be hired in larger numbers than they are now being hired.

Wants 48-Hour Advance Notice

Those adequate arrangements include giving the Railroad Retirement Board sufficient advance notice of the need for men so that we can get them on the job. A minimum of 48 hours. At times suitable arrangements would have to include means of transportation to get the men to the job.

There are other actions, too, that can terminate the services of these unseen labor forces. There are among the unseen labor force some who have quit work, some who have refused suitable work, and some who are not available for work. The Board is frequently without that kind of information. All of these conditions that I have mentioned can cause a temporary suspension of effect of the unseen labor force because we would deny benefits in those conditions.

Now we would include then two kinds of arrangements that are necessary to reduce this unseen force: Not only hiring available railroad employees for railroad jobs when you can, but also making certain that when you or your foreman have information that pertains to refusal of a man to work, his availability for work, or his voluntary leaving of his employment that that information comes to our attention.

At this point I would like to get off this main line and go down a branch line for a minute and describe for you some of the qualifying and disqualifying conditions for unemployment benefits.

Briefly they are these:

An employee must have earned railroad wages amounting to at least $400 in the calendar year preceding the previous July. That is a little complicated but it is as simple as I can state it. He must have earned at least $400 in the railroad industry in order to qualify for benefits. The way we figure it is about 35 days work.

He must be available for work and able to work. He will not be paid benefits for 30 days following a voluntary quit without good cause or refusal of suitable work at any time. We are often asked questions about disqualifying people for refusing suitable work. We

cannot answer all these hypothetical questions as they often times depend on relevant circumstances.

The law says that we have to consider the employee's physical fitness, his prior training, his experience and prior earnings, his length of unemployment, and his prospects for securing work in his customary occupation, the distance of the available work from his residence and from his most recent work. This does not necessarily mean that we very rarely disqualify anybody, as some people would be led to believe after reading the list of factors.

Now to get back to the main line again, the greatest opportunity to reduce the costs of unemployment insurance benefits lies in keeping men at work and getting unemployed men back at work.

Cites Some Examples

I would like to cite a few examples, both good and bad, of some of the things that we run into and over which perhaps each of us has some control.

Here is one example: A recruiter is sent out to get more men for a gang. He gets to the place where he wants to recruit these men. He calls the Railroad Retirement Board office and he says, "I want 15 men to ship this afternoon at three o'clock." Well, as I have said, these men are not poised on the threshold of the Railroad Retirement Board office ready to take off. It takes time to get the people who are in the unseen labor force at that location for the recruiter.

Here is another example: A roadmaster, one whom I assume is not a member of this organization or at least I hope he isn't here, requires that all the men hired be local men, none from out of town however short the distance. There are claimants who do live out of town, who would otherwise be acceptable to him and who could arrange to drive to work, but the roadmaster says no, since they are not local men, available for emergency work.

Now I should like to cite some outstandingly good examples because I think in the last couple of years everybody has been doing a much better job making use of available labor attached to the railroad industry. Here are a few examples.

A foreman knows the names of 50 men he wants to get back to work on the new gang. They have scattered all over. He does not know where they are. He gives a list of these men to the Railroad Retirement Board office. We locate each of these men who is claiming unemployment benefits and we refer them to the job from a half dozen different locations over the country. Granted they won't all report, but many of them report and they are the men whose experience he wants on the job.

Furnishes Names of Absentees

Here is another example: The foreman issues recall notices to the last known addresses of 15 men. Ten of them fail to show up. He furnishes the names and addresses of the ten men to the nearest office of the Railroad Retirement Board. These men, if they are claiming benefits anywhere, will be cut off from the benefits unless they have good reason for not reporting on the job.

This last example, which involves the use of railroad employees to find other railroad employees, the use of railroad unemployment claimant agents, is of very great importance to us. There is great potentiality in the use of these unemployment claimant agents to find people who would otherwise remain in this unseen labor force and cost the railroads money. Nearly all the railroad managements—I should qualify that and say that all major railroad managements have endorsed the idea that hiring officials should make use of the services of railroad unemployment claimant agents to find people for jobs. They are close to you. I don't think there are 50 miles between unemployment claimant agents. If they will exert themselves, and most of them will, they can do a lot to help you find the available railroad labor in your locality.

To draw this to a conclusion I would like to acknowledge that there are many circumstances and conditions in which roadmasters lack the authority to take the necessary corrective action to keep railroad employees on the job and to get railroad employees on the job in preference to new people.

Management Wants Costs Cut

I think that you have a problem, of course, in advance planning of maintenance-of-way work, some times with exclusive hiring arrangements with commissary companies and some times with physical, age and other restrictions that are not of your own choice. But I think that most of you know what needs to be done to gain sufficient authority to take the necessary action. If we are any judge of the current prevailing atmosphere in railroad management circles at this time, it seems to be one most favorable to suggestions for anything that will cut these costs.

The cost in the 12 months ending last June of unemployment benefits was $83 million. The tax for these unemployment and sickness benefits is now 2 per cent of the pay roll up to $350 a month. It is a sizeable bill. Every unemployed man in the unseen labor force represents a potential in unemployment benefits all the way from $400 to $1105.

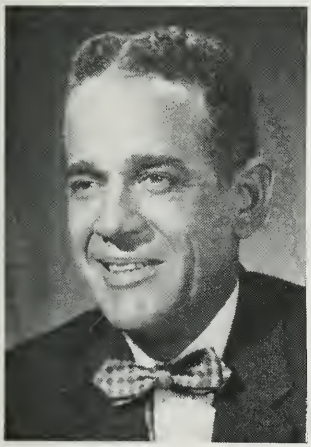
Well, these facts are now getting to be pretty well known by top management, and we do believe that any ideas or suggestions that can be given to them as to how these costs can be cut will be appreciated and well received.

You are not the only ones, of course, that have a stake, in a prosperous and healthy railroad industry. We, too, who feed on the fringe of the railroad industry have a stake in a prosperous railroad industry, and I think that it is your obligation, as we feel it is ours, to bring to the attention of management some of the things that can be done to reduce the railroad industry's tax burden. That is what I have tried to tell you about today.

Let the Motto Be Always Safety First

Report of Committee

COMMITTEE—R. D. HELLWEG, *Chairman*, asst. reg. engr., GM&O, Bloomington, Ill.; B. L. PRITCHARD, *Vice-Chairman*, gen. fore. b.& b. & w.s., AT&SF, Clovis, N. M.; W. R. COX, *Vice-Chairman*, asst. div. engr., SAL, Raleigh, N. C.; R. E. ENDERLE, div. engr., B&O, Garrett, Ind.; C. J. FLAYHART, insp. m. of w., PRR, Williamsport, Pa.; R. L. FLETCHER, struct. engr., TIMBER ENGR., Washington, D. C.; R. L. HECKER, b.& b. & w.s. supv., C&O, Plymouth, Mich.; L. R. MORGAN, AAR, Chicago; I. A. MOORE, ch. engr., C&EI, Danville, Ill.; F. C. ZETTLER, b.& b. mast., CP, Schreiber, Ont., Can.; A. M. GLANDER, (ret.), ch. carp., CMStP&P, Austin, Minn.; J. S. TOH, drafts., MP, St. Louis, Mo.; T. DAVIDSON, asst. mgr., GLOBE CHEMICAL, Chicago.



R. D. Hellweg
Chairman

Always safety first is not something new to our railroad industry. *Always safety first* is the basis of the operation of any railroad and we have prepared this report to remind all of you *Always safety first.*

Each one of us here should and must make it our personal responsibility to enlighten as many of our fellow workers to safety as is humanly possible. One thing we should all learn is that a safe worker is one who has been properly educated to his job; therefore, we must bear in mind that any new worker must be properly instructed in his duties.

Good results can be obtained in reducing casualties if supervisors and foremen will do the following with each new employee:

(1) Instill the idea of self-preservation in each new employee.
(2) Impress upon him the importance of preventing accidents to others.
(3) Teach him to be constantly on the alert.
(4) Point out the need for him to avoid brooding over marital troubles while on duty.
(5) Teach and thoroughly explain to him all work and safety rules.

When a man is properly instructed to perform his duties you are practicing *always safety first.*

This being a group of maintenance men we will confine our report in the greater part to safety in maintenance of way work.

The managements of our railroads are safety conscious and they make no secret of their interest. This is brought out in a maintenance of way book of rules of one of our carriers, where appears the following notice: "Safety is of the first importance in the discharge of duty." We, as representatives of management, must bear in mind that eternal vigilance is the price of safety.

Prevention of injuries to B&B employees is the responsibility of all of us and we must impress upon all of our bridge and building employees, from the bridge engineer on down to our common laborer, that "safety is of the first importance in the discharge of duty." Before *always safety first* can mean anything we ourselves have got to be sold on safety and believe in it. When this is done then we can try to work to the end of *always safety first* by reminding our fellow employees to clothe themselves properly by

(a) Wearing safety shoes.

(b) Wearing clothing that fits properly and that is not ragged.

(c) Using a good grade of gloves and discarding them when they are worn out, replacing them before they get ragged.

(d) Wearing safety helmets when working under bridges, especially if there are others working above them.

(e) Wearing life preservers when the occasion requires, such as when removing drift from bridges during high water. Life preservers should always be on hand when working on bridges where the depth of the water warrants it. They should be placed so that they are immediately available in case of emergency. They should always be equipped with a hand line.

(f) Using goggles at all times when doing the following jobs: Welding, cutting, striking metal against metal, chipping stone or concrete and grinding.

Safety Programs

A large number of our roads have a definite safety program and we on this committee feel that it is very worthwhile. Under a safety program we feel that it is advisable for the master carpenter or the B&B supervisor to hold a safety meeting at least once a month with each of the gangs under his jurisdiction. It is felt further that each foreman should give a short safety talk to his men at least once a week. For the information of our membership the National Safety Council has prepared a booklet which contains 52 short safety talks suitable for a foreman to read or give to his men on a weekly basis. These are available from the National Safety Council, 425 N. Michigan Avenue, Chicago 11, Ill. There is a small charge for these pamphlets but the cost is not prohibitive.

At monthly safety meetings the B&B supervisor should have definite and specific points of safety to talk about. The men should be informed of accidents that have occurred recently on the district. They should be given the cause as developed by the investigation and the steps taken to avoid a recurrence of similar accidents.

Of course when we say the supervisor should hold a monthly meeting with each gang, it is not our intention to relieve him of his ever-present duty to his men, his company, and himself, always to be on the lookout to see that every job is done safely.

Safety is not the job of the director of safety nor of the supervisor alone. It requires the cooperation of every man on the job. The supervisor must sell safety to the men he supervises. In order to do this he must have the confidence of his foremen and workmen, and he must be sincere in his personal actions, and convincing in his discussion of safety. He must have an attitude that will put his workmen at east without sacrificing discipline so that the men are able to think in the right direction. Safe habits cannot be successfully developed in men by a process of continuous rebukes and criticism. Remember: When due, a word of praise goes a long way and is always well accepted.

The supervisor must have a thorough knowledge of his job and of safety. He must practice safety at all times. He must have a sincere belief in his safety program before be can teach or promote or encourage safety. He must be interested in the general welfare of his men and not just teach safety because he has been instructed to do so. It is mandatory that he have enthusiasm, sincerity and emotional stability, a combination that cannot be obtained without first having a real desire to help his fellow men.

Working Conditions

It has been reported that men working under very dangerous conditions, such as around derailments and washouts, in tunnels following failures, etc., are less apt to get hurt than those who are doing more or less routine work. Men who are close to danger are more on the alert and are more constantly on guard than men who are working where there is little apparent danger, as they allow their minds to stray from the work at hand. It is this type of man that we must reach and make him always conscious of *always safety first.*

In bridge work we must not overlook our responsibility to the public. If there is a possibility of objects falling, such as materials or tools, which could injure passersby, a suitable railing or covered passageway should be constructed. If weather conditions are such that ice will form, any waste water covering walkways should be covered with sand, salt or ashes to prevent slipping.

When work is completed at the end of a day, all tools, including ladders, should be put away to prevent accident to any possible trespasser. Good housekeeping is essential to the safety of the public as well as to the workmen themselves.

Conclusion

The overall idea of *always safety first* must begin with the management of our railroads. Every workman must understand that it is the aim of his superiors to prevent accidents, yet he must also know that unsafe practices are grounds for disciplinary action.

Safety meetings for the workmen are not enough, and the supervisory employees should have separate meetings at regular intervals and see that the workmen are trained in the proper and safe use of their equipment.

Consequently, through the use of proper training, and close intelligent supervision, our goal of *always safety first* can be obtained.

Discussion

N. H. Williams (D&H) stated that the men on the Delaware & Hudson wear their goggles at all times. However, he said, this has paid off in a big way because he knew of seven instances where men had their eyes saved because they wore such safety glasses. In one instance a man was 25 feet away from the point of action and a chip of concrete shattered his goggles.

J. D. Walker (CNR) stated that it was very difficult to instill the proper safety attitude in his employees and he wondered what was the answer.

E. R. Schlaf (IC) felt that it was a matter of getting the employee in a receptive safety consciousness. Mr. Williams mentioned that he obtained the cooperation of the safety chairman at the meetings. They prepared addresses on certain safety assignments. However, he had noticed that the rank and file of the employees became interested when some of these talks were given by their own men.

When M. Kleigle (CRI&P) asked if these safety sessions were held during work hours, Mr. Williams answered that they were. The meetings are held on the job and once a year the road has a special family party, being served box lunches, and the president of the railroad makes a safety address. Such a party costs money, he said, but the railroad figures it is well worth it.

J. O. Born (Me.Cen.) stated that he observed that the Bangor & Aroostook does not necessarily dwell always on railroad safety at their safety meetings, but also bring in safety features, at their home and with their automobile. This, he feels, gets the men thinking more of safety. H. D. Curie (B&O) stated that his road enlists the interest of the men by having a program the first day of every month. Two supervisors hold meetings at three points on their districts so that every employee has an opportunity to attend a safety meeting. The discussion may be on safety in general, but they let the employees speak on whatever subject it may be as long as it concerns safety.

President Gunderson (WM) advised that his road has safety instruction cars to bring messages to the men. The meetings are held in the cars, and the men are paid while they attend. This is one sure way, he said, of getting the messages over to the men.

President Gunderson then asked if discipline was effective when employees violated the rules. Mr. Walker stated that his road had a very strong safety program but they did use discipline for the violation of rules. Some men, he said, accept discipline by admitting their mistakes, and it has been observed that they don't make more of the same mistakes. But some men, he said, are defiant and are not prone to accept discipline and refuse to admit being careless.

J. T. Koloc (IC) stated that discipline for violation of safety rules does not have too much effect on an uncooperative individual. The proper attitude is important for every individual. Even though a fine may be assessed to a violator if he is caught, it doesn't deter the others from violating the rules. He thinks that the prevention of accidents and the proper attitude can be instilled by (a) initial instructions and education, and (b) qualified teachers. He felt that the motto: "Always Safety First" should be changed to read: "Safety First" because it is the one most used by railroads. Mr. Koloc felt that carelessness is attributable to failure of the foreman and supervisor and the latter should be trained better than they are. Education of employees by the foreman and supervisors will do more to forestall accidents than anything else, he said.

Mechanization, Tools and Equipment

Report of Committee

COMMITTEE—H. O. ADKINS, *Chairman*, gen. supv. w.s., D&RGW, Denver, Colo.; C. B. FOSTER, *Vice-Chairman*, b.& b. supv., SOU, Greensboro, N. C.; R. M. SCHMIDL, *Vice-Chairman*, assoc. ed., RAILWAY TRACK & STRUCTURES, Chicago; E. C. DEWITT, asst. b.& b. supv., SP, El Paso, Tex.; R. B. MIDKIFF, ch. engr. m.w.& s., SOU, Knoxville, Tenn.; J. T. GOSSARD, b.& b. supv., WM, Hagerstown, Md.; J. W. ROWLAND, supv. struct., LI, Jamaica, N. Y.; J. T. ROBERTS, b.& b. supv., SOU, Somerset, Ky.; R. H. CARPENTER, div. engr., MP, Little Rock, Ark.; A. H. BLACKHAM, cont. Abbotsford, B. C., Can.; J. T. DERRYBERRY, asst. b.& b. supv., WM, Cumberland, Md.; P. S. SETTLE, vice-pres., RAILWAY MAINTENANCE, Pittsburgh, Pa.; M. J. HUBBARD, asst. ch. engr., C&O, Huntington, W. Va.; R. H. PATTERSON, b.& b. supv., SLSW, Pine Bluff, Ark.; H. WARFIELD, (ret.), insp. m.w., New Brunswick, N. J.

H. O. Adkins
Chairman

As the cost of labor continues to increase, we, in the construction and maintenance departments of our various railroads, must continually and constantly strive to increase the efficiency of our crews by creating, adopting and adapting new, and often times novel, mechanical aids for performing our work.

Just as a contractor cannot afford to use pick and shovel methods of construction and meet competition, we railroaders cannot survive on our maintenance and improvement dollars unless we constantly and consistently utilize modern equipment as it becomes available to us.

We will endeavor to confine our discussion as to what is available, something of its background and to what extent it is being utilized by our represented organizations. Comparison of the possibilities of utilization and advantages over present methods will be left up to you.

That mechanical equipment is indispensible and profitable is borne out generally by the number of our gangs and the personnel now employed plus the maintenance of low operation ratios.

Mechanical equipment may be subdivided into many classes and categories depending upon their application. We are primarily interested in three general classifications, namely, "on-track equipment," "off-track equipment" and a third that might be designated as "portable equipment."

On-track Equipment

Pile drivers are a universal need. While the overall use or days in service per year are less, the necessity for a rapidly moving versatile machine has increased with the operating speed of our modern railroads. Several railroads owning steam-powered equipment with many years of remaining service have adapted their equipment to diesel engine propulsion, with the pile hammer actuated by flash-type steam boiler or heavy-duty compressors.

Others advise that due to prohibitive costs of extraordinary overhaul and adaption, they have scrapped their equipment and resorted to rigid, semi-rigid or swinging leads, with diesel-operated, self-contained hammers or air hammers, suspended from and propelled by available or new on-track or mobile cranes. These may be classed as combination pile-driver-cranes, or pile-driver-wreckers, according to their individual adaptations. The machines may be custom made, or shop conceived and executed arrangements. On smaller railroads, or in case of emergency or convenience, contractors' equipment is often used. This sometimes proves economical where such equipment is available and driving can be done without a work train.

The economy of a composite machine, that is cranes with detachable leads that can be utilized 365 days a year, is self-evident.

On-track cranes, clams and derricks when ready for replacement are often being supplanted by mobile off-track or combination on- and -off track equipment mounted on rubber tires or trucks. Cost of overhaul of existing equipment plus the increased efficiency of off-track equipment appears to be the deciding factor in the replacement.

"On-track" compressors primarily purchased and intended for track surfacing gangs have not always proved economical for general bridge work due to cost of moving. The trend apparently is toward replacement with, or acquisition of, off-track and composite units.

Deterioration in idleness on this type of equipment is being increasingly recognized and eliminated where possible by replacement with tractor compressors or similar equipment.

A "bridge machine," now on the market and in use by a member railroad, is designed for one-man operation and provides a mechanical means of performing certain operations in the replacement of stringers, ties and curbs or timber trestles. In addition, compressed air is provided for spike drivers, drills, impact wrenches, and metal and wood saws.

The machine consists of an 85-cu ft rotary air compressor mounted on flanged wheels. It is self-propelled by an air motor through a transmission, and has, as optional equipment, a hydraulic lift and elevator. It is equipped with four-wheeled air brakes and four drills adjustably mounted in vertical slides. Drills will operate simultaneously from the driver's seat and serve to drill ties and guards.

The use of this machine makes possible considerable reduction in man-hours over hand methods as the operator can perform a large percentage of the drilling operations and also drive the spikes and curb fasteners after they are set by hand. As sufficient power is available, hand operations such as miscellaneous drilling, sawing and driving can be carried on at the same time.

So called "push-car derricks" or "winch cars" are in general use. The push-car derrick consists of a turntable mounted on a heavy-duty car and on which table is mounted a sturdy derrick frame with a boom arm of adjustable length from 9 to 15 ft long.

Standard models are of 3 tons capacity, have worm-gear gas-engine drive or are hydraulically operated, and are propelled by a heavy-duty motor car. This equipment is utilized by four- to eight-man gangs to remove and replace bridge caps, stringers, ties or deck; load, unload and transport materials; install concrete, galvanized or cast-iron pipe adjacent to or under the track; and clean drift from bridges. The car is equipped with rail hooks, outriggers and ballast rack for stability.

Trucks in three-quarter to three-ton capacities are offered by manufacturers that are equipped for highway or rail travel. However, even though on the market for some time, these have not received general acceptance.

"On-track" weed sprayers are used to apply chemicals for the control of weeds and brush on many railroads. Sprayers vary in size from trailer-car-mounted tanks and pumps to box cars specially equipped and used in conjunction with several tank cars of chemicals and water. The cost of adapting company equipment or obtaining equipment for company use should be carefully reviewed in comparison with charges made by competent contractors in this field.

Off-track Equipment

Draglines, especially of ⅜ to ¾-yard capacity, have been utilized generally, and are frequently assigned to one gang engaged in installing or replacing pipes or culverts, concreting, bridge renewals, and construction, or other operations requiring quick, economical and frequent moving of materials, equipment or earth. By proper programming one gang can and does utilize such machines for indefinite periods. In addition, where ever possible and practical, the machine can expedite the work of other departments such as ditching and for loading and unloading fill materials. Composite machines equipped with drag bucket, clam bucket, rock grab and shovel booms prove highly efficient.

Bulldozers usually represent a considerable investment, however, they have a high efficiency in excavating, backfilling, leveling and ditching operations. Many roads use dozers for additional operations such as filling bridges, removing structures and trees, fence construction, emergency washouts and road construction.

Assignments of dozers to bridge crews is apparently less frequent than draglines. Bulldozers can generally be rented cheaper locally for occasional operations when moving in and out time is considered for company equipment.

Dozers coupled to carryalls are used to fill bridges that are to be retired or replaced by temporary culvert pipes, and one or more bulldozers can often repair a washout. Utilizing one or more dozers and a

temporary culvert pipe it is possible to fill washouts and have traffic moving in less time and at less expense than by cribbing or driving a bridge.

Due to the availability of commercial, county, city and state equipment and the fine cooperation of these agencies the pile driver crew and work train is being relegated from a first concern to a last resort in washouts.

Truck or self-mounted cranes and shovels, with post augers, post drivers, winches or booms, are being used to advantage. While usually too expensive for economical assignment to the average crew, they are usually utilized on a division or system basis.

Truck-mounted winches are generally accepted as a good investment and this is also true of rear hydraulic end gates, material lifts and pump beds.

Trucks having capacities of 1 to 1½ tons are generally recognized by all to have proven their economy, and railroads are equipping bridge gangs with such equipment in increasing numbers. Terminal gangs and those engaged in work within reach of highways have reduced travel time, travel hazard and delays through the use of trucks instead of motor cars.

Frequently the use of trucks to haul both material and men is hampered by local and state laws, and some forethought must be given as to the pre-delivery of materials. Special truck bodies providing separate compartments for men, materials and tools have been introduced on some railroads.

The efficiency of pickup trucks has been enhanced by the addition of removable racks, motor-car runners and enclosures. Panel trucks prove effective for water service where retension of tools and equipment in the conveyance is essential. The pickup truck is more versatile and more commonly used.

Tractors with winches on front or rear, or both, are accepted as standard equipment and are utilized with or without trailers for transportation of men, materials and equipment. When equipped with compressors, front-end booms, dozer blades, backhoes, and post-driving, augering equipment both vertical and horizontal, their service is greatly enhanced.

Small self-propelled trenchers, relatively new on the market, have proven economical and are utilized for installation of conduits, cables, plastic and mechanically jointed cast iron or steel pipe where assembly can be made on the surface and then lowered into the narrow trench.

Self-propelled flanged-wheel and skid-mounted compressors are being superseded by rubber-tired equipment in all sizes. Air-operated tools are encroaching upon the usually more readily portable electric generator and equipment. Reciprocating tools such as rock drills and jackhammers are receiving preference over electrically operated tools. Reciprocating air saws are a rather recent development and have been received favorably. It is reported that they are superior in accuracy over chain saws. Many roads now equip all gangs with power saws.

Power-driven Portable Tools

The success of our work with mechanized equipment is dependent upon the efficient utilization of the power we have available and its adaption to work that would otherwise be performed manually.

Air-operated drills, impact wrenches, saws, jacks and hammers have largely superseded hand tools formerly considered standard equipment. Some bridge gangs have been rather well supplied with these items of transfering them from other departments.

A composite application of track-mounted equipment and tools has been devised by one railroad that is evidence of creative ability and application of mechanical equipment. An air compressor, self-propelled on flanged wheels, was revamped to include a self-elevating scaffold with an air hoist added to raise paint drums or equipment. A small boiler was included to generate steam. The machine was designed primarily to clean and coat steel bridges with grease-type materials which require heating upon application, however, it can be used for conventional bridge and structural painting and for repairs on truss-type bridges.

Another railroad has designed and had constructed several small gasoline-powered double-drum hoists with a line speed of 140 ft per min. These are utilized with a variety of drag tools and collapsible shovels for cleaning culvert pipe and also for removing earth from pipe jacking operations. These machines have an auxiliary gear and jack shaft which converts the equipment to a conventional winch.

Concreting has been expedited by utilizing ready-mix plants that are now located in most towns and cities of any size, and from which concrete, tailored to the purchasers' desires, is delivered to the construction site within a reasonable distance. Portable gasoline or electric-powered belt conveyors are often utilized to transport the concrete into the forms where ready-mix trucks cannot approach close enough.

Where ready-mix concrete is not available, a portable plant may be set up at a convenient location. The materials are handled by a crawler-type clam bucket discharging into a batching hopper, then by gravity into the mixer and all concrete may then be handled by belt conveyor into the forms. If the construction is more remote, such as tunnel lining operations, the concrete may be transmitted by pumpcrete machines. Little hand work is involved in the entire operation.

Still another railroad reports the successful and economical assembly line production of hardwood highway sectionized crossing timbers, and that they prepare ready-made and durable crossings for their entire system.

The material is sized to the desired dimensions and cut to accurate length by powered equipment. The timber is then drilled and countersunk at proper intervals for assembly bolts and holddown fastenings. These operations are performed by a simultaneous assembly of six powered drills. The timber is then framed for fitting next to the track rail and those used in end sections are beveled. The correct number of timbers is then placed on an assembly frame where the bolts are installed, after which the completed sections pass to the treating cylinder before shipment. The entire operation is handled by eight men and the saving over previous hand methods is conservatively set at 20 per cent.

Several railroads report mechanization in the construction and replacement of right of way signs by centralizing the construction or repair of old signs and posts at a central sign shop.

One railroad describes a two-man operation in which one experienced welder, with a boom and winch mounted on a tractor, cuts, assembles and welds new signs in place, or repairs old ones. The signs are then taken into the shop and assembled on steel racks for painting. The sign shop operator then prepares the sign faces for securing overlays. The entire sign receives two spray coats of primer and paint.

Some states have made it mandatory for railroads to install highway cross-buck signs with a reflectorized background. Several railroads have adopted this same process for roadway signs. The signs are generally prepared in a central sign shop. The principal equipment is a vacuum machine with either steam or infra-red lamp bulbs supplying the heat necessary for adhesion of the reflectorized material to the metal sign. Considerable literature is available that describes the technique of this process. Other suitable reflective materials are utilized in sign shops that are equipped with modern tools and machines.

Protective materials for bridge decks are being applied with the aid of machines that heat the material and permit spray application. Both production and quality of workmanship is thereby improved and costs are reduced. These machines are adaptable to application of roof coatings and rather heavy greases for protective coating of steel structure, and also can be used for application of regular paints.

This report does not cover all developments being utilized by railroads. Many new items or work methods are being introduced each year and adapted to particular needs that arise. Some are in the testing stage and need further proof on the job before being generally discussed. Most managements have developed a healthy atmosphere that encourages creative thinking and ingenuity among supervisors and the employer. It is therefore increasingly important for supervisors to be curious and intelligent in their selection of the best that is available to them.

Discussion

L. M. Martin (GN) was enthusiastic about the high-cycle impact wrenches as they can be taken out on any job, he said, and will twist off almost any bolts. He also stated that he used the machine for banding piles together when making cutoffs. W. T. Towle (CRI&P) asked how the banding machine could pull the piles into position when making the cutoffs. Mr. Lawson stated that the banding machine pulls them altogether, and such a machine may be carried by one man.

J. D. Walker (CNR) asked how an impact wrench could get down between the chord of a bridge. H. D. Curie (B&O) stated that an extension could be placed on the wrench but it creates a hazard. Mr. Curie also mentioned that many useful machines can be devised by taking parts from different old machines and putting them together.

J. A. Jorlett (PRR) announced that he is trying out a generator mounted on a truck. The generator is a 110 volts, 60 cycles, 1000 watts and takes its power from the belt on the truck. So far it's been working out fine.

Maintenance of Automotive and Maintenance of Way Equipment

Report of Committee

COMMITTEE—E. F. GARLAND, *Chairman,* br. supv., NOPB, New Orleans, La.; R. L. FOX, *Vice-Chairman,* proc. engr., SOU, Washington, D. C.; D. J. MURRAY, *Vice-Chairman,* engr. drafts., C&WI, Chicago; JOHN FOX, engr. m. of w., QUEBEC CENTRAL, Sherbrooke, Que., Can.; E. M. CUMMINGS, div. engr., B&O, Connellsville, Pa.; W. W. GAINES, supv. b.& b., C&O, Huntington, W. Va.; H. R. PETERSON, ch. engr., NP, St. Paul, Minn.; C. A. SMITH, supv. b.& b., IHB, Hammond, Ind.; J. H. STINEBAUGH, supv. w.s. & rdwy. mach., IC, Carbondale, Ill.; C. C. GREEN, mast. carp., B&O, Wheeling, W. Va.; C. T. BLUME, supt. wk. equip., FRISCO, Springfield, Mo.; E. A. MANN, pres., CHAMPION TRANSP. SALES, Chicago; L. T. NUCKOLS, (ret.), ch. engr., C&O, Richmond, Va.; S. W. GEORGE, div. engr., WM, Cumberland, Md.

Mechanization of bridge and building forces and utilization of automotive equipment by these forces is rather broadly accepted by most railroads. Conditions vary on different railroads to such an extent that a discussion of the problems, methods of procedure for proper maintenance of vehicles, tools and equipment, and development of programs and schedules for maintenance, must necessarily be general. However, some generalities appear common among the set-ups that are evolving from experience.

Most vehicles and equipment are powered by internal combustion engines, using gasoline or diesel oil as fuel. These primary engines may in turn drive electric generators, air compressors, hydraulic motors or take-offs, or by transmissions may propel or otherwise actuate the vehicles, tools or equipment. It is evident that some problems are common to the primary engines and to the auxiliary mechanisms. In general, the problems are those encountered in the operation and maintenance of your personal automobile. Vehicles, and maintenance of way equipment and tools, are justified in railroad work by economies that can be effected, and the maximum economy is usually obtained with maximum availability and utilization. Usage is often continuous for long periods and capacity output is expected. In this respect wear and tear on railroad equipment are often severe, relative to personally owned vehicles.

The conversion of basic fuel into usable energy generally is the result of a sequence that includes injection into a chamber of the engine in combination with the proper amount of air, compression of the mixture to the point of explosion or introduction of an electric spark to induce explosion, and then discharge of the gases from combustion. This is an oversimplification of an engine but certain factors are present that cause problems. A further simplification can be used by generalizing these problems into heat and wear.

Heat is essential to an engine but dissipation of the heat after it has been utilized is necessary. This dissipation may be into the ambient air, as in air-cooled engines, or into circulating liquids, as in radiator-cooled engines. It is essential that the cooling provisions be adequate and well maintained.

Combustion, the primary source of this heat, can only occur if the carburetion or fuel-injection system is functioning properly and the key factor may be expressed as cleanliness and proper adjustment of the mixture.

Combustion, in the case of engines using gasoline as a fuel, requires the introduction of an electric spark at the proper instant. This ignition system requires cleanliness, the correct amount of electric energy, and precise timing of the electric spark.

If we assume that combustion occurs properly, and most of us have many times failed in accomplishing this essential phase with some item that we have attempted to use, then a continuation of this combustion results in movement of the internal parts of the engine. This movement inevitably results in wear of the parts and this is a function of the speed of movement and the load demand. The wear of mechanical parts and the ability to withstand the load demand is partially controlled by the design and workmanship used in construction of the machine. The balance of this control is through lubrication and again cleanliness and the provision of the proper lubrication in adequate quantity is essential.

As we move from the primary engine to electric generators, electric motors, air compressors, hydraulic drives, transmissions and tools, we encounter the same basic problems—heat and wear. Cleanliness and proper lubrication are basic, and failure to observe

these requirements is the primary cause of trouble. We can also quickly encounter trouble by trying to use an inadequate tool beyond its designed purpose, namely-overloading it. Troubles with pneumatic tires are almost too well known to require comment but disregard of these essential items will quickly make an essential item unavailable for the job.

We recognize that problems incidental to vehicles and maintenance-of-way equipment have not been discussed in detail. We think that the problems are numerous enough and serious enough to warrant the attention of rather specialized forces. The organization of these forces on the different railroads is so diverse that again, generalities can only be discussed.

Most railroads recognize the necessity for a specialized maintenance organization and rather generally have delegated the responsibility to what may be broadly termed a superintendent of work equipment. The importance of this position is receiving more recognition and this man usually has some measure of control over acquiring, as well as maintaining. It is also recognized that the position is more than one man can handle and he usually heads up an organization, as well as the facilities, to properly perform the task.

The superintendent of work equipment generally is on the staff of the chief engineer, and usually reports directly to the chief maintenance officer. It is desirable that he have authority to establish and enforce rules and regulations pertaining to the maintenance, operation and repair of maintenance-of-way vehicles, tools, and equipment. The field representatives, reporting directly to the superintendent of work equipment, but in some cases having a secondary responsibility to the district or division engineers, are commonly referred to as supervisors of work equipment.

The supervisor of work equipment should have sufficient control over field maintainers to assure that field repair work is properly performed. He should make field inspections at regular intervals and assure that proper preventive maintenance is being performed. Operation and maintenance reports should be directed to and through him. He should be thoroughly familiar with mechanical equipment and should assist in training operators and mechanics handling the items. Corrective action should be taken regarding enforcement of rules and regulations, particularly as he may observe violations, or any improper use of handling of vehicles, tools or equipment. He should inspect all new or repaired equipment as it is placed in service. He should help in any program for shopping equipment for repair and should also assist in assuring that necessary repair parts are ordered and are on hand, so that shop detention will be at a minimum. He should work closely with division supervisors to develop their cooperation and render them assistance and advise.

A shop superintendent, or shop supervisor, should be in charge of the shop used for overhaul and repair of vehicles, tools and equipment, and this man should be directly responsible to the superintendent of work equipment. This man should work closely with the supervisor of work equipment in scheduling a program for repair and overhaul work. It is assumed that his shop will have adequate tools and personnel to handle work assigned to them. Work will be expedited if repair parts are obtained in advance and a working supply of the more commonly used parts should be kept on hand.

Traveling mechanics or field maintenance men are commonly under the direction of the division engineer. This man or men, may have a small division shop that is used to overhaul and repair small power tools. They usually have a small pick-up truck, with special tool and small parts compartments, that enable them to drive to the field job needing their attention.

The matter of organization to be used in operating and maintaining equipment will cross lines of different crafts. This could be developed very extensively in this report if space were available but only the high spots can be touched. Operating equipment and tools will largely be confined to bridge and building and water service mechanics and helpers. The AREA and many individual railroads have compiled manuals of instructions for maintenance-of-way equipment. They are specific in that they deal with one or more makes of similar tools and equipment. These instructions are directed principally to the guidance of operators, foremen, supervisors of structures, division engineers and others concerned in the inspection, operation and performance of equipment. The manuals assume that operators are familiar with the purposes of the machines, have been given instruction in their use, and know what they can do. They suggest that operators have the manufacturer's instruction book and parts list, but the manuals are a sort of reminder concerned with the precautions for lubrication, capacities, types of tools used for the performance of the machine, and the

limitations on the adjustments and replacement of parts that can be made by the operators. They cover precautions that must be taken with hoses, pipe lines, and connections when working with compressed air equipment and with power supplies, wires, and protective devices when using electric power or electric generating units.

Too much stress cannot be placed on the need for safe practice, general cleanliness and good housekeeping to avoid personal and fire hazards, also to facilitate the inspection and repair of the machinery.

Because machines and tools are shifted between men and gangs, manufacturer's instruction books and parts lists are readily lost and difficult to replace. Manufacturers name plates carrying serial numbers, class of equipment, operating characteristics, and operating instructions become worn out, lost or deliberately mutilated. Some railroads carry their own badge plate numbers securely fastened to the machine. Complete data for the machine are filed under this number. The manuals, however, supplant the instruction books. They are readily available and are easy to revise. They should be published in such a form that the mechanics or operators can carry them on their persons or in their tool boxes.

Maintaining Equipment and Tools

This is divided into two chief services; maintenance in the field and maintenance in the shops. The latter will include railroad shops and shops of manufacturers, service agencies, repair shops or machine shops. Automotive tools and equipment have done much to take out the drudgery from bridge and building operations but the bane of the foreman, supervision and management is "how to keep equipment off the idle list awaiting repairs and to keep equipment in serviceable condition."

Field maintenance and repairs are the outgrowth of the early practices on many railroads when track cars, pumping stations, steam-operated cranes or pile drivers on wheels or skids, steam hoisting engines and pumps were the extent of automotive and maintenance-of-way equipment. With the presence of multitudinous internal combustion engines and various tools the need for field service is more extensive today. The use of maintenance men for servicing bridge and building equipment is limited more and more each year due to the development of the heavy mechanized track gangs. The field maintainers must put more time or their exclusive time, and their specialized abilities, with these gangs to keep their equipment operating at peak efficiency.

Most of you will concede that repairs to machines and tools can be more economically handled in a shop, or shops, especially equipped to repair maintenance of way tools and equipment. Special tools and machinery, suitable surroundings and working conditions, adequate stock of replacement parts, trained mechanics and skillful supervision can be provided in a shop. Even less skillful mechanics can do a better job in such an environment.

The trend among many railroad managements now is to establish repair shops exclusively for maintenance-of-way equipment because of the great increase in the use of mechanized equipment. Formerly the repairs to the items of automotive equipment, as well as those of power tools, welding and cutting equipment, motors, pumps and boilers, were often handled in the motive power shops and by motive power or maintenance-of-equipment employees. The establishment of maintenance-of-way shops, either on a regional or system basis on the larger roads, or at a central point on the smaller roads, has many advantages such as:

(1) Skilled mechanics, who have become familiar with the repair as well as the field performance of such equipment and tools, gravitate to shops because of better working conditions and likelihood of more constant employment.

(2) Training of mechanics is more easily performed, and is under better supervision.

(3) Stocks of repair parts are under one storekeeper, eliminating duplicate stock and helping to maintain a low inventory.

(4) Purchase of facilities can keep abreast of current developments and are more easily justified than in smaller shops scattered over the lines.

(5) Salvaging of usable repair parts is under better control.

The alternative to a company owned central repair shop, or shops, is as mentioned heretofore, to contract for the services of a manufacturers' facility, service agencies and the like. They have advantages in some instances in that they have more skillful mechanics, special equipment and available repair parts. However, they may be more costly because of their higher skilled help, cost of shipping equipment or tools, and delays due to the possible crowding of their facilities. Some of these disadvantages are

becoming minimized because of the increase in the number of specialized organizations offering their services to the railroads.

This report has necessarily been very general in presenting the assignment of this committee. As initially stated, conditions and practices vary so widely that there is no guiding light that can be held before the men concerned with this broad problem. The free exchange of information and experiences among the railroad men, and the stimulation of thinking among interested men assembled in conventions, are reasonable assurance that progress is being made. The stake of manufacturers and of consumers is so large that mutual cooperation is essential. It is the purpose of men who are charged with the responsibility of properly maintaining their company's properties to do so in a manner that will most economically utilize money allotted to them. Mechanized equipment is one of their most valued tools in accomplishing this purpose. This valued tool requires considered maintenance by all concerned.

Discussion

W. H. Huffman (C&NW) stated that the moving of mechanics from one place to another is getting to be a large maintenance item. His mechanics, he said, are on expense accounts and follow the rail gangs, tie gangs and ballast gangs and need more trucks to get around efficiently. Also, the trucks are needed to carry more spare parts with them. He asked how the mechanics are being moved on other roads.

G. W. Benson (C of Ga) stated that his road uses pick up trucks which are radio equipped. When not working with the gang itself, he said, the mechanic works on ballast tamping tools, and other machines keeping them in good condition. The mechanic is also quickly available because of the radio and uses a truck to get around.

A. E. Acord (UP) stated that the road machinist on his road have one ton trucks at the present, but these will be replaced by two-ton trucks as the older ones wear out, because the men are required to carry more tools with them. The road machinists are under the supervision of the division engineer. Large gangs on his road are serviced by machinists who take care of the machines and service them. However, he said, they do not have radios in their trucks and must be reached by telegram.

President Gunderson asked Mr. Acord if the machinists were used during off-work hours and are paid overtime. He replied that any overtime is kept at a minimum. Spare machines are also carried along with the gangs, he said.

T. M. von Sprecken (Sou.) stated that the mechanics on his road keep spare parts with them and sometimes take along a whole engine. President Gunderson remarked that his road does not provide spare machines with the gangs. A. J. Skinner (EJ&E) announced that his road does not have many spare machines. His mechanics use a ¾ ton pickup truck to get the spare parts out to the gang which will never be too far away from the starting point. His road uses a two-ton utility truck when moving a machine to replace another. His road also has a tilt-body low-boy to get the machines out on the road. The maximum distance that a machine would have to be moved, he said, would be 75 miles so they are always assured of getting the machine out on the same day. On repair work two machines are used on the road except when major repairs are needed which are made in the shop.

Utilities of Ready-Mixed, Precast and Prestressed Concrete in B & B Work

Report of Committee

COMMITTEE—F. D. DAY, *Chairman,* engr. struct., PRR, New York; S. WHITE, *Vice-Chairman,* gen. b.& b. supv., SP, San Francisco, Calif; H. A. MATTHEWS, gen. fore. b.& b. & w.s., FRISCO, Amory, Miss.; L. M. BARHAN, asst. b.& b. supv., NP, Minneapolis, Minn.; J. N. BURKEL, drafts., MP, St. Louis, Mo.; W. G. BURRES, ry. rep., PORTLAND CEMENT, Chicago; J. S. HANCOCK, br. engr., DT&I, Dearborn, Mich.; W. H. HUFFMAN, asst. engr., of maint., C&NW, Chicago; R. W. HUMPHREYS, prin. asst. engr., NP, St. Paul, Minn.; J. K. LYNCH, res. mgr., MASSEY CONCRETE, Birmingham, Ala.; A. P. SMITH, asst. engr., C&EI, Danville, Ill.; R. P. TANNER, asst. div. engr., CMStP&P, Butte, Mont.; J. F. WARRENFELLS, prin. asst. div. engr., SAL, Raleigh, N. C.; M. J. HUBBARD, asst. ch. engr., C&O, Huntington, W. Va.; R. H. PATTERSON, b.& b. supv., SLSW, Pine Bluff, Ark.; J. S. TOH, drafts., MP, St. Louis, Mo.; Y. C. BEAM, mast. carp., SAL, Americus, Ga.; F. F. HORNIG, div. engr., CMStP&P, Sioux City, Ia.; T. C. REED, supv. b.& b., L&N, Ravenna, Ky.

F. D. Day
Chairman

A subject such as the use of concrete for railroad construction can properly be handled only if it is broken down into smaller subdivisions. Accordingly this report will comprise three sections, namely:

(1) Advantages and disadvantages encountered in the use of ready-mixed concrete as compared to mixing concrete at the job site.

(2) Various uses of precast concrete products for bridges and for building construction.

(3) The possibilities of making use of prestressed concrete slabs, beams, and other shapes in railroad construction and maintenance work.

The members of this committee have been very cooperative. The roads represented span the country from New York to California. We will take up the utility of ready-mixed concrete versus job mixed concrete as our first subject.

Ready-mix Concrete

Job-mixed concrete has been used ever since Portland cement was invented and is still being used on many railroads today, particularly where there are no batching plants near the site of the work. With the advent of all the new types of cement that are now available, on-the-job mixing for large construction projects has certain advantages which cannot be overlooked. Among these advantages is the fact that if a railroad construction superintendent has charge of the batching plant he can completely control the mix. There will be no tendency to be light on some ingredients or to be strong on some of the less expensive ingredients. Also the water can be completely controlled as far as the moisture content of the sand, gravel or rock aggregates is concerned. The railroads as a whole take advantage of on-the-job mixing in railroad yards where it is difficult to get trucks across the ladder tracks or into the center of large classification yards. There are other locations where an area may be hemmed in by side hills or cuts or where the right of way extends through rugged country with no highway access whatsoever.

At these various inaccessible locations it is a fairly simple matter to set a gondola loaded with sand and coarse aggregate in on a side track, then have a box car spotted alongside or along with the gondola, the box car of course having bagged Portland cement, or, for a large job, bulk Portland cement. In arid locations it is also possible to have a tank car or perhaps two tank cars of water in behind the gondola and the box car. A well-organized crew with wheelbarrows and shovels, a Burro crane or perhaps a steam

locomotive crane and a large hopper can batch up to 100 yards a day without any difficulty using a ⅓ or ½-yd mixer. A great deal of concrete has been poured in this manner on some of the outstanding structures in the country.

We must look, however, to the labor costs involved in an operation of this type. While we are glad to take advantage of the complete control of sand and aggregate, as well as the water, (there isn't much trouble with Portland cement these days) we must never lose sight of the fact that the hand labor involved in an operation of this sort, requiring up to 10 or possibly 12 laborers, must be set against the cost to operate a centrally located ready-mixed concrete plant which can be completely controlled by not over four laborers, plus a truck driver or, depending upon the size of the operation, perhaps four to five truck drivers.

Most of the men in our B&B organization do not often deal with large construction projects. The usual job is a day-to-day maintenance proposition, involving, generally speaking, smaller projects such as repairs to a bridge seat or wing wall, casting a reinforced concrete slab, or, on the building site, pouring foundations, footings, floors, and once in a while, complete concrete buildings. The B&B supervisor, or master carpenter as he is called on some of the roads, must, with present-day costs, take full advantage of any labor saving processes. The ready-mixed concrete plant, if there is one available in his area, is certainly far more efficient, as has been proved everywhere that it is used, then attempting to mix small quantities of concrete on the job. By small we are speaking of concrete pours up to and including a project of approximately 1,000 cu yd.

Prices for ready-mixed concrete in the southwest portion of the country at the present time are running between $11 and $12 per cu yd delivered. Prices for the same ready-mixed concrete in the East runs approximately $13 to $15 per yard. As was mentioned before, the job must be located near a ready-mixed plant in order to take advantage of ready-mixed concrete. In this day and age with highways being readily accessible to most railroad locations, it is very rarely that, other than in desert country, one cannot find a ready-mixed concrete plant within a 50-mile distance. A great many roads are willing to have ready-mixed concrete transported up to 50 miles, the equivalent in time of perhaps an hour and one-half for the truck running over the highway, rather than pay the labor involved to mix the concrete on the job.

One of the disadvantages of ready-mixed concrete, is that in small batches it is necessary to use the cement which the concrete plant has in its bin, and also to use the aggregates which the plant has available. Practically all ready-mixed concrete plants nowadays are working for the highway department of the state or county in which they are located. While it may seem to the railroad men of this organization that the railroads should try to control the concrete mixes they get, nevertheless it is a fact that highway construction in this country is using far more concrete for paving and for bridge work than the railroads are using. Therefore, it would seem only logical that the railroad B&B supervisors should establish close relationship with the state or county highway engineers, that the railroad supervisor should take advantage of the tremendous research that has gone into highway paving, and that, generally speaking, the railroad B&B supervisors should adopt and utilize the state highway specifications or, in the absence of available state highway specifications, the U.S. Bureau of Public Roads' general specifications. The highway departments of each state have access to all of the aggregates or the aggregate sources in their state, and they can be generally relied upon to have thoroughly investigated the aggregates available and have specified the mixes which can best be obtained with those aggregates.

It is recommended that, for ready-mixed concrete, the local state highway specifications be used to as great an extent as possible.

An interesting sidelight of this phase of the discussion is the discovery recently made by one road that investigated the ready-mix plant in a vicinity with the thought in mind of having the ready-mix plant store or stock some air-entrained cement for use by the railroad in the structures that the railroad might build which would be exposed to the weather. It was found upon visiting the plant that the ready-mix plant had nothing except air-entrained cement in its bin, that the state highway department had specified air-entrained cement for all structures, that as far as the ready-mix concrete plant was concerned they willingly furnished the air-entrained cement at the same prices as the regular Type I cement.

In conclusion, it is the consensus of the committee that ready-mixed concrete should be used to the greatest extent possible as a

labor-saving and more efficient way to handle concrete in the field for B&B construction.

Precast Concrete Members For Use in Railroad Work

It is really amazing when one stops to consider the precast concrete products that can be used in railroad construction, to reflect upon the number and variety of precast concrete structures built over the past 50 years. We have only to think of the large number of precast reinforced concrete slabs the railroads built during the Twenties and the ones now under heavy casting for replacement of timber trestles, to think also of the large numbers of reinforced concrete cribs which have been used throughout the country, to consider the concrete plank roofs which have been installed, walks which have been placed, the large number of station curbs, the concrete pipes which are underneath all of our railroads. We should also remember that cement block and cinder block, as well as the solid concrete brick, are all precast concrete units.

There are a number of tilt-up slabs of precast concrete. Most recently we have all read about the large-area lift slabs which are being raised all over the country. Practically every month a new record is set for the size of lift slab which is raised. We have only to think of the modernization being done by a number of roads nowadays to see the great advantage of precasting at a central plant, where whole bridges are being cast. It should be remembered that prestressed concrete, which we will discuss later, also is precast in most cases. The advantage of prestressing is that the precast concrete members are considerably lighter due to their design. There isn't any doubt that railroads, where necessary, will use highway cranes and highway trucks, as well as the old method of work trains to carry pre-cast slabs and bridges to the sites and insert them.

One of the most interesting developments in precast concrete is the sandwich panel for buildings. The DuPont Company, in 1946, conducted extensive tests to find a satisfactory wall panel for one of their large plants. A precast concrete panel with a core of fiber glass was selected because it most nearly met the requirements. Many other companies have found that these precast sandwiches, with an insulating core, make excellent wall panels. The finish is simple, erection and installation rapid, the finish on the concrete which can be obtained at the central casting yard is practically perfect and requires very little maintenance for a long period of time.

For building work there are now available many new color aggregates which allow the construction of yard offices, railroad freight stations and passenger stations in color concrete. The colors have proved very durable. Along this same line we must consider the stone, or imitation stone facing which is obtained by a precast application of colored mortar. This imitation stone finish gives a very pleasing effect to old passenger or freight stations that are converted to a modern appearance.

At the present time the replacement of timber trestles with precast and in most cases prestressed members is going on apace in the southwest territory of the country.

One of the difficulties with precast concrete is the joint in the field when the material is erected. This problem now has been solved by the use of modern plastics that allow practically any variety of shapes to be used for corner joints, lap joints, floor and ceiling spacing. Expansion is always a problem, but this is found with the modern plastic joints to be rather easily solved.

In closing this section of the report we should point out that precast concrete at a central plant has many advantages over pouring on the site. Everything from foundation grade beams on buildings, to the floors, walls, roof and even, on some railroads, of the sidewalks, can be readily handled at a precasting plant.

Prestressed Concrete

Prestressed concrete is not new. It has been in use in Europe, particularly in Germany, for the past 25 years. There are a number of beautiful bridges in various sections of Germany that have used prestressed concrete. At this point perhaps a little clarification on prestressed concrete should be made. As most of us know, prestressed concrete implies that when the concrete member is ready to be used, ready to be loaded, it has in the material itself a stress set up in the steel to such an extent that the concrete is in compression. The design of these members which use prestressing is such that under loaded conditions the concrete will always remain in compression. This of course prevents cracks when the loading is released from the member, and also provides a reduction in the weight of the concrete required to carry an equivalent load, as compared to conventional designs.

There are two generally accepted types of prestressed concrete. One is known as pretensioning. The other is known as posttensioning. In both types high-tensile steel

reinforcing is required, whether it is wires, cables or bars. Pretensioning of prestressed concrete means simply that the wires or reinforcing cable are stretched in a casting pit to the extent that a predetermined elongation of the reinforcing takes place. This keeps the reinforcing under high stress while the concrete is poured around them. After the concrete has taken its set and has cured, the jacking members are released. The bond between the steel and the concrete transfers the stress from it to the solid member and places the concrete in compression.

The other method of prestressing concrete is to pour concrete around tubes or sheaths which contain the reinforcing that will prestress the concrete. After the concrete has set, the wires or cables inside the tubes are placed under tension by threading a fitting at the ends and tightening this fitting against the concrete. The concrete is brought under compression by the stress applied through the steel in the tubes or sheaths. After all have been stressed to a high degree of tension, the tubes or sheaths are then pumped full of grout to protect the tensioning members.

Prestressed concrete, while it can be done by the railroads and probably will be done to a greater extent by the railroads, at the present stage of development is probably best left to the large number of plants that are springing up around the country. They handle prestressed beams, slabs, roof members, and will design or prestress and precast whatever is required by the railroads. Prestressed concrete offers many applications. At the present time in the southwest, prestressed stringers are being put into existing timber pile trestles to carry the deck where wood stringers have deteriorated. In other locations, prestressed concrete piles are being driven. These piles are then capped with prestressed caps and finally prestressed stringers and deck slabs are being installed to carry the roadbed.

In the building end of the B&B work a large snow shed has been recently installed on one of the western roads to replace the structure that was on the line for a number of years. This snow shed was installed near Cisco, Calif., and has proved very satisfactory. Precast slabs were placed on a concrete foundation and a shed was placed above the slabs so as to clear the existing timber construction. The shed provides snow slide protection of the track in a mountainous area. All work was done with a 25-ton locomotive crane.

On another railroad in the eastern section of the country, in a harbor area, a new pier has been built. This pier has prestressed concrete throughout the deck and stringers, as well as in the pile cap units. This pier is used by one of our large railroads for a freight operation. The construction of the pier was considerably simplified by having prestressed concrete caps, beams and floor panels trucked in from a nearby casting yard and placed in position.

There are at the present time very few completely prestressed concrete bridges on any railroads in this country. However, tests are being made on the few that are built.

It should be pointed out that in general the advantage of prestressed concrete is for a lighter construction unit, or in the case of bridges, for better clearance. The elimination of minute tension cracks under live load will increase durability.

Most railroad bridges that are now being built are built in connection with highway programs. The one or possibly two-foot difference in depth that can be gained in an undergrade crossing through the use of prestressed girders will have a growing influence on the design of concrete bridges.

In conclusion we can say that concrete is a very versatile material. If properly formed and poured it requires practically no maintenance for a long period of time. Certainly we want to use it to as great an extent as possible. All railroad B&B supervisors should constantly keep alert to modern developments in precast and prestressed members which can be used to advantage by their particular roads and effect labor savings that will then bring down the overall cost of maintaining the B&B section of their road.

Discussion

Mr. Weaver (LI) advised that state inspectors will be glad to inspect concrete at the ready mixed plants if they are contacted in time. His road has used precast units after first being submitted for bids.

Another member asked Chairman Day what the size of the concrete stringers were that are mentioned as having been used for strengthening in the report. Chairman Day stated that he believed the size of the stringer was kept to the same size as the wood stringers and that they were used on the Texas & Pacific.

J. V. Inabinet (SAL) announced that his road is using prestressed piles and precast caps. He announced that he was agreeably

surprised at the care his men used in handling the prestressed piles. His men, he said, picked up 50 foot piles with a pickup line and so far had not dropped any. The only damage to piles to date, he said, was one out of 340 that were handled.

Branch Line Bridges and Buildings and Their Maintenance

Report of Committee

COMMITTEE—W. F. PETTEYS, *Chairman*, div. engr., ERIE, Hornell, N. Y.; G. S. CRITES, (ret.), div. engr., B&O, Baltimore, Md.; S. FOGARTY, JR., track supv., C of Ga., Millen, Ga.; T. A. HARRISON, const. spec., ARMCO, Middletown, Ohio; J. W. N. MAYS, engr. struct., PRR, Chicago; W. H. PRYOR, gen. fore. b.& b., FRISCO, Memphis, Tenn.; V. D. RAESSLER, supv. b.& b., IC, Memphis Tenn.; T. F. CREED, res. engr., SOU, Washington, D. C.; H. H. HALL, asst. div. engr., SOU, Atlanta, Ga.; F. W. HUTCHESON, supv. b.& b., C&O, Newport News, Va.; V. W. HUTCHINGS, b.& b. supv., SP, Bakersfield, Calif.; C. LEDUE, fld. sls. mgr., REPUBLIC POWDERED METALS, Chicago; W. H. RAINEY, b.& b. supv.; T&NO, San Antonio, Tex.; L. B. RASMUSSEN, supv. struct., PRR, Williamsport, Pa.; A. C. PRICE, b.& b. mast., CP, London, Ont., Can.; E. T. CROSS, vice-pres., ARMCO, Middletown, Ohio; G. C. BUSKIRK, mgr. r.r. dept., U. S. BORAX & CHEMICAL, Omaha, Neb.; C. M. BURPEE, exec. dir., AWPI, Chicago; W. H. BUNGE, asst. engr., MP, St. Louis, Mo.

W. F. Petteys
Chairman

A branch line can be considered a feeder line to a main, through or trunk line. Under this definition, a branch line is one of generally lighter traffic density and lower speeds than its corresponding main line. The scope of this report will touch on the design, construction, maintenance and renewal of bridges and structures on such lines.

It is obvious that bridges and structures designed for main track use will also be satisfactory for branch lines. However, this may not always be the economical solution. In general, a main through line is designed and constructed for permanence whereas a branch line, while it may be designed and constructed for permanence is in many instances designed and constructed with many other ideas in mind such as industrial development, short life expectancy, emergency relief, financial conditions, etc. Since our committee is dealing with branch lines only, we will limit our discussion to bridges and structures adapted to these lines.

The most economical type of structure, aside from small pipe culverts, to span an opening under a track from the initial cost point of view is still the open-deck, pile bent timber trestle, of treated or untreated materials. Where life expectancy has no bearing on the case the open-deck, pile-bent untreated timber trestle will safely and adequately serve the purpose. The disadvantage of this type of structure is its extremely short service life of from 5 to 15 years. Where a somewhat longer life is required and where economic conditions prohibit a more costly initial investment the open-deck, pile-bent treated timber trestle will provide an adequate and safe structure which will serve for 30 years or longer.

A feature often overlooked in the choice of the open-deck, timber trestle is its susceptibility to fire, caused both from the operation of trains over it, and from fires spreading in from the surrounding area. To reduce the fire hazard from train operation several protective methods are in use, such as covering the exposed surfaces with sheet metal, coating the exposed surfaces with fine, stone screenings held by a mastic binder, or treating timber with fire retardant preservatives. The ballast-deck timber trestle, while somewhat higher in initial cost than

the open-deck trestle, will eliminate most of the fire hazard from train operation. An investigation of timber trestle fires reveals that very few fires occur on those having a ballast-deck. Another feature of the ballast-deck trestle is the independent track surface across the structure.

The fire hazard to timber trestles from fires spreading in from the surrounding area can be reduced by thoroughly scalping the surrounding ground of brush and combustible material and the application of chemical weed and/or brush killers or some form of soil sterilant. On long timber trestles the construction of fire stops or fire breaks at intervals will generally confine a fire to a given area and prevent it from spreading and consuming the entire structure.

Many of these open- and closed-deck, pile-bent timber trestles are in existence on branch lines and are being kept safe by relatively economical annual maintenance.

The comparatively recent advent of huge earth moving machines has made available earth fill at remarkably low costs and since open- or closed-deck timber trestles more often than not provide considerably more opening than is actually required, earth covered metal or concrete pipe culverts in single or multiple units can be utilized economically to provide the opening desired. The initial cost of this type of construction is somewhat higher than that for timber trestles, but where initial cost is not a determining factor, the longer life expectancy of up to 60 years free from fire hazard and comparatively free from maintenance costs, warrants the expenditure whenever possible. In addition to this and where life expectancy is not so important, the ease with which pipe culverts can be recovered for further use at other locations when the branch line is retired also makes this type of construction most desirable. To get the 60-year life the invert of metal pipe culverts can be paved with Portland cement or asphaltic concrete up to as much as six inches in depth in large pipes to protect pipes against scouring action of sand and gravel during high water or when installed on steep grades. Headwalls are not generally used with this type of construction on branch lines, width of right of way permitting. Beveled ends can be used on metal drainage pipes for an economical end finish.

Next in the economic scale as regards initial cost is the concrete arch or box. While this type of structure is much more expensive than the previous types mentioned, it has its advantages in that it eliminates fire hazard, is comparatively maintenance free, and has a life expectancy of up to 75 years. Its disadvantages are cost of construction, difficulty of handling and placing materials and length of time to construct.

Lastly, in the economic scale as regards initial cost, is the steel bridge. Steel bridges as new installations will not be discussed at this time as their use would only be resorted to after a very comprehensive engineering study has been made of the particular opening required. This situation would not be peculiar to branch lines only but would apply equally to any railroad location plans. However, there is an issue here which should not be overlooked in the choice of bridge structures. In general on branch lines speed is of secondary importance and can be regulated. On most railroads, the speed of trains on branch lines is restricted relative to main-line traffic. This speed restriction runs anywhere up to 50 per cent of the permissible speed on the main line. By lowering the speed of trains, impact is reduced and thus branch line bridges can safely be used with loading formulas from 15 to 30 per cent lighter than their main-line counterparts — thus as steel bridges approach the end of their useful life on the main line they can be re-used indefinitely on branch lines. In addition to this the possibility of using obsolete or abandoned steel turntables as bridges on branch lines should not be overlooked.

Maintenance continues to be an ever-increasing problem in bridge work. Whereas at the time of original construction on most railroads the ratio of cost, especially in timber, stone and concrete construction, was about 2 to 1, labor over material, labor costs have more than tripled. The maintenance of bridges on branch lines thus becomes of extreme importance and since the character and extent of business on any branch line determines its economic importance as well as its service life, it is difficult to arrive at a set of rules to cover the situation. In general, however, it can be assumed that branch-line bridges are maintained at minimum standards that are consistent with safe operation.

In bridge maintenance work it should be remembered that the ratio of labor to material is about three to one, since old, worn-out material must be removed and new material applied while the structure remains in safe operating condition. Considering then the high cost of labor, materials used for maintenance and renewal purposes should be such as to provide the most economic initial cost consistent with its desired service life. In most instances involving the use of timber

then, it should be recognized that the best timber pressure treated, is none too good.

However, there are instances where second-hand material can be economically used regardless of the life expectancy of the structure. As an example, the renewal of bridge ties on main track steel bridges is usually done out of face. Since the renewal of these bridge ties is, in general, occasioned through crushing, rather than from other causes, before the full life expectancy of the deck of ties can be realized, 15 to 25 per cent of the ties removed are in excellent condition. These ties must have been of superior material since they withstood the conditions which caused the balance of the ties to fail. Therefore, these ties under light traffic conditions on branch lines can be re-used efficiently and economically. In this instance the cost of new treated bridge ties must be weighed against the cost of second-hand bridge ties which, unless so used, can have little if any further value excepting possibly as cribbing. Good second-hand timber also has its uses in timber-trestle repairs, as backwall timbers on bridges and as back and wingwalls on pile-bent timber trestles.

In the matter of maintaining pile-bent timber trestles on branch lines that serve a relatively permanent need, it is probable that repairs to these structures are costing too much. This is especially true when fire hazards and winter drift conditions are considered. As previously stated, the opening provided is more often greater than actually required. In many instances, where the opening is for drainage purposes, the drainage can actually be contained in a single pipe. Again, modern earthmoving equipment has reduced the cost of fill to the extent that it is more economical to install pipe and fill than to maintain in kind. In this connection satisfactory concrete pipe or corrugated metal pipes are obtainable in large diameters and built-up metal pipes up to 15 ft in diameter. These pipes can be used either singly or in multiple units and are obtainable in a variety of shapes to meet practically all requirements. Where larger or more permanent openings are required the concrete box or concrete or metal arch may be utilized.

Again, on branch lines where their use may be expected to be limited and when major repairs are required for safe operation, the installation of concrete or corrugated metal pipes and bridge filling can be justified due to the fact that these pipes in long lengths can be easily salvaged and much of this kind of work has been done. Interest on the investment in the new pipe, filling, and depreciation accruals on the pipe compared with the annual maintenance of present structures will determine the economic choice. Elimination of the fire hazard as well as damage from derailments is a plus value in favor of filling when possible.

Failing stone arches can be most economically rejuvenated by shotcreting the surface and pressure grouting with practically no loss in area of opening.

Failing stone and concrete arches can also be repaired and rejuvenated by lining them with standard pipe or prefabricated metal arches with minimum loss of area of opening and at reasonable cost.

In cases where old culverts are in need of major repairs they can be lined with corrugated pipe or a new opening of pipe can be tunneled or jacked into position around or adjacent to an old pipe or box at minimum cost.

In the matter of branch-line buildings, here it is only necessary that buildings provide for functional requirements and most railroads curtail expenditures accordingly. It has become the practice to utilize any available space in existing buildings to provide the required quarters regardless of the condition or previous use of the building. Here it can truly be said that minimum maintenance consistent with safety and regard for employees' health and welfare is the rule rather than the exception.

Economy, however, should not be the sole consideration in the construction and maintenance of branch-line buildings. In many instances the shipping public's only connection with a railroad is the occasional glimpse of that railroad it gets while driving along the public highways or from an occasional visit to the agent's office. The reaction the public gets from what it sees should at least be favorable. Unkempt, dilapidated, unpainted and undermaintained branch-line structures cannot help but create an unfavorable opinion in the mind of the shipping public. No structure should be in such physical condition that it cannot proudly bear the name of the road it represents. However, such structures need only be simple and neat, not showy and elaborate.

The tremendous progress that has been made on pre-engineered, prefabricated buildings during the last few years presents new possibilities in the satisfactory and economic maintenance of branch line buildings. A prefabricated building of almost any con-

ceivable size is now available. Prefabricated metal buildings, because of ease of erection, lend themselves more readily perhaps to the type of structure desired for railroad purposes than do other types.

In standard sizes, neat, trim and entirely functional prefabricated metal buildings of the frameless type, in sizes of from 6 to 28 ft in width and almost any conceivable length, are already in extensive use on branch lines as well as main lines on many railroads. They can be quickly and easily erected with an average building and bridge gang without special tools, are attractive in appearance, fire resisting, weatherproof and completely portable; that is they can be easily dismantled, relocated and quickly assembled without appreciable loss. They lend themselves readily for use as stations, freighthouses, garages, pumphouses, warehouses, section tool houses, crossing watchmens' shanties and a host of others. Such buildings may be painted, insulated, heated and air conditioned. They are easily maintained and require only an occasional coat of paint to keep them presentable.

It is conceivable that certain branch lines may have situations where clear span requirements exceed the 28-ft widths available in the frameless-type buildings. In such cases prefabricated rigid-frame metal buildings are available in clear span widths of from 32 to 100 ft.

The growing acceptance of prefabricated metal buildings by the railroads is evidenced by the fact that one manufacturer has sold over 3600 such buildings to 126 railroads with present sales running about 500 buildings a year.

Some railroads have designed portable metal buildings of the frameless type such that they can be picked up and hauled to a new location without dismantling them. This is the ultimate in portability.

Since the end of World War II a new type of building construction, which lends itself readily to low cost building on branch lines is coming rapidly forward. This is the pole frame construction type with pressure-treated poles. The benefits to be derived from this type of construction include low cost, elimination of expensive foundations, ease of construction, versatility and flexibility. Because of simplicity of construction and the long-lasting qualities of their construction materials, upkeep costs of pole buildings are low. This type of building also is adapted to modern materials handling systems, lift trucks and other efficient transportation equipment.

The cost of rearranging old frame or masonry buildings to be made suitable for various branch-line operations and the subsequent maintenance costs thereof, are sufficient in many cases to pay for a new prefabricated or pole-type building within a very few years. Then, too, there is often an appreciable tax saving in replacing large, old buildings with small modern buildings of sufficient size to handle current needs.

In view of the ever-increasing cost of taxes, the expense of providing, equipping and transporting maintenance forces, and with full regard to the health and welfare of the employees, more and more railroads are realizing that it is more economical to lease the required building space, convenient to the property, to provide for functional requirements. By so doing a minimum of space consistent with actual requirements is provided, cost of utilities such as light, water and heat is shared with other tenants as well as cost of taxes and the problem of maintenance as regards company forces is practically eliminated.

In many locations railroad facilities including stations, are housed in over size or obsolete buildings which enjoy the best business sites in the area. Aggressive railroad real estate men should not find it difficult to persuade local businessmen to purchase the property and establish, for instance, a new, smart, shopping center on the site, leasing to the railroad, space in the new building as required.

In summarizing this report many suggestions have been made which we hope will be of benefit to the association as a whole. However, there appears to be no definite rules that can be set up governing the construction and maintenance of branch line bridges and buildings. It is a problem peculiar to the individual railroad and more or less governed by location and service requirements.

Discussion

President Gunderson asked if in the case of branch line bridges, the design loading can be reduced. R. W. Gilmore (B&O) stated that the AAR research laboratory has established that the critical impact speeds are around 35 miles per hour. Hence, he said, lower load requirements cannot be used for the design of branch line bridges.

The question was raised by J. O. Born (Me. Cen.) as to the recommended spacing of fire stops on bridges, of a length of about 1,500 ft., and what material is used in the fire

stops. J. V. Inabinet (SAL) stated that he has many long bridges under his jurisdiction and uses fire breaks of asbestos material. These fire breaks have been in service for many years, but, since he has experienced no outbreak of fires, he cannot say how long they will remain effective. He stated that the fire breaks material was applied to both sides of the bents and are spaced about 200 to 300 feet apart.

J. A. Jorlett, (PRR) stated that his road has used wrought iron fire breaks as he has found that asbestos material is subject to damage from snow and ice. Mr. White (PRR) stated that there is another method of creating fire breaks and that is to spot in steel members salvaged from other bridges into the timber bridges used on branch line. Mr. Jorlett (PRR) was interested in the pole-type buildings mentioned in the report and asked who had had any experience with such buildings. Chairman W. F. Petteys (Erie) stated that he had obtained this information from the Timber Institute.

The discussion then turned to the subject of fire breaks. W. H. Bunge (MP) stated that his road had used concrete fire breaks on the long timber structures. T. M. von Sprecken (Sou.) stated that his road had first installed fire breaks on Ponchartrain trestle with 500 ft spacing. However, this proved quite expensive so he extended it to 1000 feet apart. It was his opinion that the best spacing for fire breaks should be such that the burned-out portion could be restored quickly. This would call for about 250-ft spacing, otherwise a bridge might be closed to traffic for two or three weeks. Another feature in favor of fire breaks, he said is that they serve to strengthen a structure against longitudinal movement.

J. W. Rowland (LI) stated that he had a very long trestle which would cost a great deal to replace. So his road put the fire breaks about 150 ft apart. But, a fire burned out 1,200 ft of it before it could be stopped because high winds caused the fire to jump the fire breaks. Winds have been known to cause a fire to jump 125 ft, he said. He felt that concrete fire breaks were the best to use over salt water and that the decks of all trestles should be fireproofed.

A. L. Becker (MP) announced that prefabricated buildings are expensive. He took bids on a prefab and a building of his own design. Cost of the prefab was 25% more.

What Should the Supervisor Expect from Management and Vice Versa?

Report of Committee

COMMITTEE—N. H. WILLIAMS, *Chairman*, b.& b. mast., D&H, Oneonta, N. Y.; R. D. BISBEE, *Vice-Chairman*, div. engr., P&SF, Slaton, Tex.; P. E. SCITES, *Vice-Chairman*, asst. supv. b.& b., C&O, Huntington, W. Va.; P. H. KOEHLER, supv. wk. simp., C&O, Huntington, W. Va.; G. R. WEBBER, ch. carp., CMStP&P, Spokane, Wash.; J. H. BABBITT, div. engr., B&O, Indianapolis, Ind.; H. M. HARLOW, asst. gen. supv. b.& b., C&O, Richmond, Va.; R. H. MILLER, prin. asst. engr., B&A, Houlton, Me.; J. L. PERRIER, div. engr., C&NW, Chicago; D. A. RUHL, engr., U. S. Army (O.A.C.), Joliet, Ill.; H. S. TALMAN, gen. supv. b.& b., C&O, Richmond, Va.; E. M. ENGER, supv. b.& b., CStPM&O, St. Paul, Minn.; R. R. GUNDERSON, engr. m. of w., WM, Baltimore, Md.

N. H. Williams
Chairman

Every member of our association who is responsible for the actions of subordinates is a manager. To avoid any confusion about what is meant by the terms "management" and "supervision," your committee placed this connotation on its assignment: What should appointed supervision expect from top management and vice versa?

Management is a group of individuals united in a common purpose of directing human and material resources toward a common goal. That goal is to maintain the economic health of the property. Economic health is appraised in terms of net income. Net income is produced by getting things done through people, for people, at a profit. Supervision represents and is management to the people they supervise. It is through the supervision that the policies, objectives and procedures of a company are communicated to the employees.

At a recent national management association conference, more information on both policies and decisions seemed to rank high on the supervisors' "want list." Better understanding of what is expected of the supervisor was considered of primary importance by 26 per cent of the supervisors. Next in order were requests for more participation in management decisions, more training, with more pay and more authority a minor aspect of management-supervisor relations. This is a resume of a reprint from "The Iron Age," which appeared in the April 1957 issue of "Management Review."

Supervision should expect that top management will make its overall policy known to them and it wants to be told the direction that policy is to be applied. It needs clear, concise and unobstructed lines of communications up, down, and across. (All of us have heard things through the grapevine long before they were officially told to us, and we were embarrassed by the men working under us who knew something that we didn't know and should have known). Information from management—sufficient information to feel a part of management—is desired. Good morale exists when a man has pride in his company and that pride is developed by effective communication.

Insistence on realistic, written annual programs of maintenance and capital expenditure work is expected. Proper programming is essential. It is necessary so that there will be continuity of employment for a basic labor force to provide a cadre of trained personnel for leadership when required maintenance programs and capital improvement work is expanded. The laborer is worthy of his hire. It is axiomatic that in the planning and direction of the work full consideration be given to the establishment and maintenance of good labor relations. Sufficient clerical help to maintain essential but not elaborate control over operations is a pre-requisite of planned supervision. Recognition of the

importance of adhering to the programs is one of the basic desires of a supervisor, and this includes, insofar as it is practicable, the fervent desire that requests from other departments for non-program work (that is largely based on expediency) be held to an absolute minimum.

Sympathetic consideration of requests for power equipment should be expected. When budgetary limitations prohibit the fulfillment of the request, an explanation of why the equipment was not provided is a reasonable desire. It is otherwise frustrating and discourages thinking along mechanization and equipment improvement lines.

A supervisor's standing in the community is reflected by the opinion held by the community about the railroad he represents. Management should be expected to maintain good public relations and be a good neighbor in the communities along the lines.

Insistent demands that all concerned make a serious and a sincere effort to maintain as effective accident prevention program is needed. This requires a program that is specific, practical and of genuine interest to the men based on a knowledge of accident producing conditions found in railroad work. A supervisor should expect that he will be allowed to correct all unsafe conditions or practices with reasonable promptness or that a logical explanation for the delay or inability to make the change be given to the individual who reported the unsafe condition or practice.

Supervision must be practiced as a profession. It is an art. It requires skills. It is a science. It must analyze and form sound conclusions quickly and accurately with vision to foresee the consequences of these decisions. Therefore, remuneration commensurate with its professional attainments and performance so that it can keep abreast of the high wages, overtime rates, and fringe benefits paid to the workers they supervise is a reasonable expectation. A junior executive's salary should be sufficient to maintain this status in his community.

Supervision wants management to maintain a climate in which it can grow and develop. The maintenance of a high degree of morale within the organization should be expected. Incentives and motivations for self-development are required. Individual development of people within the organization should be encouraged and appraised. Supervision hopes that management will insure the development of people within the organization will be a continuing and effective process. It should expect that membership in professional groups and active participation in committee meetings, with a reasonable amount of traveling, will be encouraged by top management and that it will be allowed to make educational visits to properties where specilialized operations will provide information of value.

All of us in our contacts with our men on the line have seen merit and ability sidetracked so that seniority would prevail. A supervisor should expect that selection for added responsibilities will be based on merit, ability, and performance. He expects commendation for superior performance of duty.

Job descriptions covering the duties of each grade of supervision is necessary. This job description should be specific, clearly defining the responsibility, authority, and accountability of each grade, and the establishment of realistic performance standards is expected. Review and appraisal of performance against these standards should be fed back to the individual in a post-appraisal interview.

It is obvious that management people are becoming increasingly conscious of the nature of their responsibilities, and it is evident that they are more and more determined to fulfill these responsibilities effectively. It is expected that the ideal steps to be followed in getting things done through people will be considered, but supervision is aware that such steps as are necessary to secure results must be used. A summary of what the supervisor should expect from top management is contained in this quotation from Clarence Francis, former chairman of the board of General Foods: "I believe the greatest assets of a business are its human assets, and that the improvement of their value is both a matter of material advantage and moral obligation; I believe, therefore, that employees must be treated as honorable individuals, justly rewarded, encouraged in their progress, fully informed, properly assigned, and their lives must be given meaning and dignity on and off the job."

Conversely, top management should expect that its appointed supervision will be proud of and speak well of the company they represent and will carry out the directives of management with unquestioned honesty of purpose and devotion to duty. Management does expect that its supervision will maintain safely and adequately, consistent with the use to which the facilities are subjected and the resources made available for the purpose, in the most efficient manner pos-

sible, the physical facilities for which they are responsible, using every measure available to promote the use of safe practices and procedures in carrying out the work.

It expects its supervisors will be able to, and that they will, plan a realistic program and, following approval, will carry it out with the least possible interference in a workmanlike manner, expeditiously and efficiently and that the plans for doing the work will be made common knowledge—written where possible. This means that authority for doing the work will be assigned to individuals and that the individuals will be told how much authority they have to do the job. The organizational units are expected to be told by the supervisor what their objectives are and what is expected from them and that they will be given a goal. This is a time limit (a date) placed on every job after a careful analysis of the work to be done.

Continuous review of plans and schedules for the completion of programmed work to see that progress is maintained and that the operations are done in accordance with the most efficient methods available is expected by management. The work must, of course, be done in accordance with regulations of the various municipalities, state and federal governments. The working assignments must be made in accordance with the provisions and interpretations of existing labor agreements and in the planning and directing of the work consideration must be given to the establishment and maintenance of good labor relations.

Management expects that humane treatment will be afforded all individuals and that the dignity of the individual will be preserved. It expects that in the planning of the work sales and service engineers will be contacted as necessary, also that tests of material and/or equipment that indicate economies of operation will be recommended when they are economically justified.

Due to the expense involved, it is important that work train service be held to an absolute minimum.

Management believes a supervisor must make things happen this way; that things must not be allowed to work, they must be made to work. He is expected to keep abreast of the latest developments in maintenance of way work through technical publications and activities in professional associations. In cases where on-the-spot judgment is necessary, management should expect the supervisor to ask himself this question: "What would I do if it all belonged to me and I had to pay the bill?" Planned supervision is a cycle. The first step is planning. Second, the plans are put in operation. Next, the plans, work schedules, and performances are reviewed to see how well the plans are working out. Then, by this feedback method plans are developed whereby the work can be done better.

Management should expect that work simplification studies will be made, that the supervisor will pick a job to improve, that he will break down the job, that he will question every detail of a job, that he will use these types of questions: Why is it necessary? What is its purpose? Where should it be done? When should it be done? Who is the best qualified to do it? What is the "best way" to do it? This is the way new methods are developed and unnecessary details eliminated and management expects that the new method will be used until a better method is developed.

A supervisor is expected to believe that safety is of the first importance in the discharge of duty and to believe that obedience to the rules is essential to prevent accidents. Investigation of all accidents to determine the cause and responsibility for the accident is expected. Management should expect that action will be initiated and procedures established to prevent a recurrence of the accident. It wants close contact maintained with injured personnel. It should expect accident prevention thinking at all levels of the organization.

Good housekeeping is always required. Protection of company property is expected. Management expects the use of company-owned tools, equipment and other assets will be policed and that the supervisor will see to it that they are fully protected against loss, damage, or mis-use. A supervisor is expected to maintain useful files, records, and reports so that necessary data are available when needed. Management expects that a supervisor will secure material and equipment for prompt repairs to tracks and structures when train operations are interrupted by accidents or acts of God that make such drastic action necessary.

A supervisor should be expected to make periodic, impersonal, analytical, judicial evaluations of personal traits of character and technical qualifications of subordinates and to outline to subordinates in as formal a manner as possible the conditions that will exist when they are properly performing their assignment. A supervisor is expected to apply the Golden Rule in review and appraisal. (This can well mean you are not being tough enough).

A supervisor is a tool of management that requires constant sharpening. Management believes that the success of a supervisor is in direct ratio to the degree of planning he does —that it is through planning and programming that the number of emergencies he is involved in are reduced. Management should expect the supervisor to possess the qualities of leadership and creativity. He is continually expected to improve his ability to get things done through people by improving his knowledge, skills, habits and attitudes. The supervisor is expected to cooperate beyond the thin line of departmental jurisdiction and to maintain a tactful, cordial relationship with officials of other organizational units, public officials and associated industries so that a mutual feeling of trust and confidence is built up and confirmed by each contact.

Management should expect that the supervisor will take time out to THINK, that he will do flexible thinking, thinking that will change with the times and that he will *Work Smarter—Not Harder.* That he will develop rapidly and effectively a competent replacement for himself. He who gave us the Golden Rule said, "No man can serve two masters." Management should expect, and it does expect, that a supervisor will take remedial action when and where necessary, that he will commend as well as condemn, that he will have guts and the ability to tell people what he thinks of their performance and still retain their respect. Application of these skills, habits, and attitudes builds morale. You are simply doing unto others as you would have others do unto you as you GET THINGS DONE THROUGH PEOPLE.

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	A. I. Gauthier	W. B. Hotson	E. L. Sinclair	R. C. Bardwell
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	1934-1935	1935-1936	1936-1937	1937-1938
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1st V.-Pres.	T. H. Strate	E. C. Neville	C. M. Burpee	F. H. Masters
2nd V.-Pres.	E. C. Neville	C. M. Burpee	F. H. Masters	W. S. Lacher
3rd V.-Pres.	A. B. Scowden	F. H. Masters	C. A. J. Richards	C. A. J. Richards
4th V.-Pres.	W. R. Roof	C. A. J. Richards	W. S. Lacher	F. H. Cramer
Sec.-Treas.	C. A. Lichty	C. A. Lichty	C. A. Lichty	C. A. Lichty
Directors	C. M. Burpee	A. L. McCloy	W. R. Roof	B. R. Meyers
	W. A. Batey	R. P. Luck	T. P. Soule	G. S. Crites
	L. C. Smith	H. H. Best	F. H. Cramer	R. E. Dove
	C. A. J. Richards	W. R. Roof	B. R. Meyers	T. P. Soule
	A. L. McCoy	T. P. Soule	G. S. Crites	A. Chinn
	R. P. Luck	F. H. Cramer	R. E. Dove	L. G. Byrd

	1938-1939	1939-1940	1940-1941	1941-1942
President	Armstrong Chinn	A. E. Bechtelheimer	H. M. Church	R. E. Dove
1st V.-Pres.	F. H. Cramer	F. H. Cramer	R. E. Dove	F. H. Soothill
2nd V.-Pres.	A. E. Bechtelheimer	H. M. Church	F. A. Soothill	G. S. Crites
3rd V.-Pres.	H. M. Church	R. E. Dove	G. S. Crites	A. M. Knowles
4th V.-Pres.	R. E. Dove	F. H. Soothill	A. M. Knowles	N. D. Howard
Sec.-Treas.	C. A. Lichty	C. A. Lichty		
Secretary	.....	.....	F. O. Whiteman	A. G. Shaver
Treasurer	.....	.....	F. E. Weise	F. E. Weise
Directors	L. G. Byrd	B. R. Meyers	N. D. Howard	R. E. Caudle
	W. R. Ganser	W. Walkden	L. G. Byrd	I. A. Moore
	F. H. Soothill	A. S. Krefting	K. L. Miner	W. A. Sweet
	B. R. Meyers	A. M. Knowles	R. E. Caudle	J. L. Varker
	W. Walkden	L. G. Byrd	I. A. Moore	L. E. Peyser
	A. S. Krefting	K. L. Miner	W. A. Sweet	Martin Meyer

	1942-1943	1943-1944	1944-1945	1945-1946
President	G. S. Crites	J. L. Varker	J. L. Varker	N. D. Howard
1st V.-Pres.	R. E. Caudle	R. E. Caudle	R. E. Caudle	F. G. Campbell
2nd V.-Pres.	A. M. Knowles	N. D. Howard	N. D. Howard	J. S. Hancock
3rd V.-Pres.	N. D. Howard	F. G. Campbell	F. G. Campbell	E. H. Barnhart
4th V.-Pres.	J. L. Varker	J. S. Hancock	J. S. Hancock	W. F. Martens
Secretary	A. G. Shaver† Lorene Kindred‡ Elinor V. Heffern	Elinor V. Heffern	Elise LaChance	Elise LaChance
Treasurer	F. E. Weise	C. R. Knowles	C. R. Knowles	C. R. Knowles
Treasurer Emeritus		F. E. Weise	F. E. Weise	
Directors	M. Meyer	W. F. Martens	W. F. Martens	A. B. Chapman
	L. E. Peyser	A. L. McCloy	A. L. McCloy	W. A. Huckstep
	K. L. Miner	L. C. Winkelhaus	L. C. Winkelhaus	F. R. Spofford
	F. G. Campbell	E. H. Barnhart	E. H. Barnhart	Guy E. Martin
	J. S. Hancock	A. B. Chapman	A. B. Chapman	B. R. Meyers
	L. C. Winkelhaus	L. E. Peyser	L. E. Peyser	L. E. Peyser

†To November 1, 1942
‡To February 1, 1943

	1946-1947	1947-1948	1948-1949	1949-1950
President	F. G. Campbell	J. S. Hancock	E. H. Barnhart	W. F. Martens
1st V.-Pres.	J. S. Hancock	E. H. Barnhart	W. F. Martens	W. A. Huckstep
2nd V.-Pres.	E. H. Barnhart	W. F. Martens	W. A. Huckstep	Guy E. Martin
3rd V.-Pres.	W. F. Martens	W. A. Huckstep	Guy E. Martin	F. R. Spofford
4th V.-Pres.	W. A. Huckstep	G. E. Martin	F. R. Spofford	Lee Mayfield
Secretary	Elise LaChance	Elise LaChance	Elise LaChance	Elise LaChance
Treasurer	C. R. Knowles	C. R. Knowles	L. C. Winkelhaus	L. C. Winkelhaus
Directors	Guy E. Martin	H. M. Harlow	Lee Mayfield	H. M. Harlow
	B. R. Meyers	H. B. Christianson	F. M. Misch	V. E. Engman
	L. E. Peyser	F. R. Spofford	W. D. Gibson	G. W. Benson
	H. M. Harlow	Lee Mayfield	H. M. Harlow	F. M. Misch
	H. B. Christianson	Franz M. Misch	V. E. Engman	L. R. Morgan
	F. R. Spofford	W. D. Gibson	G. W. Benson	J. A. Jorlett

	1950-1951	1951-1952	1952-1953	1953-1954
President	W. A. Huckstep	Guy E. Martin	F. R. Spofford	Lee Mayfield
1st V.-Pres.	Guy E. Martin	F. R. Spofford	Lee Mayfield	H. M. Harlow
2nd V.-Pres.	F. R. Spofford	Lee Mayfield	H. M. Harlow	J. A. Jorlett
3rd V.-Pres.	Lee Mayfield	H. M. Harlow	J. A. Jorlett	R. R. Gunderson
4th V.-Pres.	H. M. Harlow	J. A. Jorlett	R. R. Gunderson	W. H. Huffman
Secretary	Elise LaChance	Elise LaChance	Elise LaChance	Elise LaChance
Treasurer	L. C. Winkelhaus	L. C. Winkelhaus	L. C. Winkelhaus	L. C. Winkelhaus
Directors	F. M. Misch	M. H. Dick	W. H. Huffman	M. H. Dick
	L. R. Morgan	R. R. Gunderson	L. R. Morgan	J. F. Warrenfells
	J. A. Jorlett	J. F. Warrenfells	B. M. Stephens	G. Switzer
	M. H. Dick	W. H. Huffman	M. H. Dick	B. M. Stephens
	R. R. Gunderson	L. R. Morgan	J. F. Warrenfells	W. H. Bunge
	J. F. Warrenfells	B. M. Stephens	G. Switzer	E. R. Schlaf

	1954-1955	1955-1956	1956-1957
President	H. M. Harlow	J. A. Jorlett	R. R. Gunderson
1st V.-Pres.	J. A. Jorlett	R. R. Gunderson	W. H. Huffman
2nd V.-Pres.	R. R. Gunderson	W. H. Huffman	M. H. Dick
3rd V.-Pres.	W. H. Huffman	M. H. Dick	B. M. Stephens
4th V.-Pres.	M. H. Dick	B. M. Stephens	H. D. Curie
Secretary	Elise LaChance	Elise LaChance	Elise LaChance
Treasurer	L. C. Winkelhaus	L. C. Winkelhaus	L. C. Winkelhaus
Directors	B. M. Stephens	J. F. Warrenfells	W. H. Bunge
	W. H. Bunge	H. D. Curie	E. R. Schlaf
	E. R. Schlaf	J. M. Lowry	G. W. Benson
	J. F. Warrenfells	W. H. Bunge	J. M. Lowry
	H. D. Curie	E. R. Schlaf	T. M. von Sprecken
	J. M. Lowry	G. W. Benson	H. A. Matthews

CONSTITUTION

ARTICLE I.

NAME

Section 1. This association shall be known as the American Railway Bridge & Building Association.

ARTICLE II.

OBJECT

Section 1.** The object of this association shall be the advancement of knowledge pertaining to the design, construction and maintenance of railway bridges, buildings, water service facilities, and other structures, by investigation, reports and discussions.

Section 2. The association shall neither indorse nor recommend any particular devices, trade marks or materials, nor will it be responsible for any opinions expressed in papers, reports or discussions unless the same have received the endorsement of the association in regular session.

ARTICLE III.

MEMBERSHIP

Section 1. The membership of this association shall be divided into five classes, viz: Members, life members, associate, honorary and junior members.*

Section 2.** A member shall be a person in a position above rank of gang foreman in connection with roadway bridge, building and water service work, or in the employ of a public regulatory body, a professor of engineering in a college, an engineering editor, or a government or private timber expert. Any person desirous of becoming a member shall make application upon the form prescribed by the executive committee, setting forth his name, age, residence and practical experience. He shall furnish at least three references to whom he is personally known. Applicants may be voted into membership at any regular executive meeting or by letter ballot of the executive committee, a majority vote being necessary in either instance.

Section 3.** To be eligible for a life membership a member must have belonged to the association for at least twenty years and in general must have retired from active railway service due to age or physical disability. He shall have all the privileges of active membership, except the holding of office, and shall not be required to pay annual dues. The transfer from membership to life membership shall be made in the same manner as the election of members, as prescribed in Section 2, of this Article.

Section 4. Associates shall be responsible persons who are not eligible as members, whose pursuits or attainments qualify them to co-operate with members in the study and development of improved practices in the construction and maintenance of bridges, buildings and water facilities. They shall have all the rights of members except of voting and holding office. They shall be elected in the manner prescribed for members, in Section 2, of this Article.

Section 5. Honorary members shall be chosen from persons who have attained acknowledged eminence in some branch of engineering or railway service. Their number shall be limited to ten. Honorary members shall be proposed by not less than six active members and shall be elected by the unanimous vote of the members

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*Amended October 16, 1941.
**Amended September 20, 1948.

present at a regular meeting. They shall have all the rights of active members except that of holding office and shall be exempt from the payment of dues.

Section 6. A junior member shall be a person who is a graduate of a recognized engineering school, or who has been employed for at least two years in the design, maintenance or construction of railway bridges, buildings or structures. Applicants shall be at least 21 years of age and they shall be elected in the manner prescribed for members, in Section 2 of this article. Juniors shall have all the rights of members except that of holding office. When the attainments of a Junior are such as to qualify him as a member, he may apply for promotion and the Executive Committee shall authorize such promotion when qualifications warrant the action. Unless a Junior is promoted, his membership shall cease automatically when he becomes 28 years of age.*

Section 7. Any member guilty of conduct unbecoming to a railroad officer and a member of this association, or who shall refuse to comply with the rules of this association, shall forfeit his membership on a two-thirds vote of the executive committee.

Section 8. Membership shall continue until written resignation is received by the secretary, unless member has been previously expelled, or dropped for non-payment of dues in accordance with Section 1 of Article VII.

Section 9.** Only active members shall hold office in this association, and only active and life members shall be entitled to vote in the election of officers.

ARTICLE IV.

OFFICERS

Section 1†. The officers of this association shall be a president, three vice-presidents, a secretary, a treasurer and six directors who with the most recent past president shall constitute the executive committee.

Section 2. The past presidents of this association, previous to the most recent past president, who continue to be members, shall be privileged to attend all meetings of the executive committee, of which meetings they shall receive due notice, and be permitted to discuss all questions and to aid said committee by their advice and counsel; but said past presidents shall not have a right to vote, unless called upon to fill a quorum.

Section 3. Vacancies in any office shall be filled for the unexpired term by the executive committee without delay.

ARTICLE V.

EXECUTIVE COMMITTEE

Section 1.** The executive committee shall manage the affairs of the association and shall have full power to control and regulate all matters not otherwise provided for in the constitution and by-laws and shall exercise general supervision over the financial interests of the association, and make all necessary purchases and contracts required to conduct the general business of the association, but shall not have the power to render the association liable for any debt beyond the amount then in the treasury plus accounts receivable and not subject to other prior liabilities. All appropriations for special purposes must be acted upon at a regular meeting of the association.

Section 2. Meetings of the executive committee may be called by a majority of the members of the committee, providing 10 days' notice is given members by mail.

Section 3. Five members of the executive committee shall constitute a quorum for the transaction of business.

ARTICLE VI.

ELECTION OF OFFICERS AND TENURE OF OFFICE

Section 1. Except as otherwise provided, the officers shall be elected at the regular annual meeting of the association and the election shall not be postponed except by unanimous consent of the members present at said annual meeting. The

*Amended October 16, 1941.
**Amended September 20, 1948.
†Amended September 21, 1957.

election shall be by ballot, a majority of the votes cast being required for election. Any active member of the association not in arrears for dues shall be eligible for office, but the president shall not be eligible for reëlection.

Section 2‡. The president, three vice-presidents, secretary and treasurer shall hold office for one year and the directors for three years, two directors being elected each year. All officers retain their office until their successors are elected and installed. A director elected for a three-year term shall not be eligible to serve two consecutive terms.

Section 3.† The term of office of the secretary and the treasurer may be terminated at any time by a two-thirds vote of the executive committee. Their compensation shall be fixed by a majority vote of the executive committee.

The secretary shall also serve as secretary of the executive committee.

Section 4. The secretary and the treasurer shall be required to give bond in an amount to be fixed by the executive committee.

ARTICLE VII.

MEMBERSHIP FEE AND DUES

Section 1.† Every member upon joining this association shall pay to the secretary an entrance fee and dues as prescribed by the executive committee. No member in arrears for annual dues shall be entitled to vote at any election and any member more than one year in arrears may be stricken from the list of members at the discretion of the executive committee.

Section 2.‡ A person stricken from the list of members because of non-payment of dues, upon written application may be reinstated as a member in his former class without loss of privileges, either upon payment of all back dues (which must accompany application) or at the discretion of the Executive Committee voting in the manner prescribed in Section 2, Article III.

ARTICLE VIII.*

LOCAL SECTIONS

Section 1.** Upon the application of ten or more members of the association residing in the same geographical district, or having offices therein, the executive committee shall organize a local section for that district, to which all members in that district shall be eligible. Such local section shall admit to active membership only members in good standing. It shall hold not less than two meetings each year, and shall be governed by such constitution and by-laws not inconsistent with the constitution of this association as the section membership may adopt and the executive committee of the association approve.

Section 2. The parent association shall not be put under any obligation, either financial or in the matter of policy or opinion, by any local section.

ARTICLE IX.

AMENDMENTS

Section 1. This constitution may be amended at any regular meeting by a two-thirds vote of the members present, provided that notice of the proposed amendment or amendments has been sent to the members at least 30 days previous to said regular meeting.

BY-LAWS

TIME OF MEETING

1.** The regular meeting of this association shall convene annually during the month of September, the exact date to be fixed by the Executive Committee.

PLACE OF MEETING

2.** The place of holding the annual convention shall be Chicago, Ill.

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†Amended October 17, 1940.
*Article adopted 1922.
**Amended September 20, 1948.
‡Amended September 21, 1957.

3. It shall lie within the power of the executive committee to change the location or time of the meeting if it becomes apparent that it is for the best interests of the association.

QUORUM

4. At the regular meeting of the association, 15 or more members shall constitute a quorum.

**DUES

5. The annual dues, for the fiscal year ending August 31, and payable in advance, shall be as follows:*

Members, $5.00; Associate Members, $4.00; Junior Members, $2.50.

DUTIES OF OFFICERS

6.† The president shall have general supervision over the affairs of the association. He shall preside at all meetings of the association and of the executive committee; shall appoint all committees not otherwise provided for, and shall be ex-officio member of all committees. He shall with the secretary sign all contracts or other written obligations of the association which have been approved by the executive committee. He shall render a detailed report at least three times during the year to the members of the executive committee, showing the financial condition of the association and its activities.

At the annual meeting the president shall present a report containing a statement of the general conditions of the association.

7. The vice-presidents in order of seniority shall preside at meetings in the absence of the president and discharge his duties in case of a vacancy in his office.

8.† It shall be the duty of the secretary to keep a correct record of the proceedings of all meetings of this association, and of all accounts, between this association and its members; to collect all moneys due the association, and deposit the same in the name of the association. He shall pay all bills when properly certified and approved by the president and the treasurer, and make such reports as may be called for by the executive committee. He shall also perform such other duties as the association may require.

9.‡ The treasurer shall have charge of the funds, check all deposits as made by the secretary, sign all checks after they have been approved by the president, and invest all funds not needed for current expenses as directed by the executive committee. He shall report at each annual meeting on the condition of the finances.

NOMINATING COMMITTEE

10.# After each annual meeting the president shall appoint a committee consisting of five members. Two Past Presidents shall be members of this committee, one of whom shall act as Chairman. No other officers of the Association shall be appointed to this committee. This committee shall prepare a list of names of nominees for officers to be voted on at the next annual convention in accordance with ARTICLE VI of the Constitution, said list to be read at the business session of said convention. Nothing in this section shall be construed to prevent any member making further nominations.

AUDITING COMMITTEE

11.‡ Prior to each annual meeting the president shall appoint a committee of three members, not officers of the association, whose duty it shall be to examine the accounts and vouchers of the secretary and the treasurer and certify as to the correctness of their accounts.

COMMITTEE ON SUBJECTS FOR DISCUSSION

12. After each annual meeting the president shall appoint a committee whose duty it shall be to prepare a list of subjects for investigation to be submitted for approval at the next convention.

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†Amended October 17, 1940.
‡Adopted October 17, 1940.
*Amended October 16, 1941.
**Amended September 20, 1948.
#Amended December 4, 1950.

COMMITTEE ON INVESTIGATION

13. After the association has adopted the list of subjects for investigation the president for the succeeding year shall appoint the committees who shall prepare the subjects for report and discussion. He may also appoint individual members to prepare reports on special subjects, or to report on any special or particular subject.

PUBLICATION COMMITTEE

14. After each annual meeting the executive committee shall appoint a publication committee consisting of three active members whose duty it shall be to coöperate with the secretary in the issuing of the publications of the association. The assignment of this committee shall be such that at least one member shall have served on the committee during the previous year.

ORDER OF BUSINESS

15.† Call to order by president.
Opening prayer or invocation.
President's address.
Report of secretary.
Report of treasurer.
Appointment of special committees.
Reports of standing committees and presentation of papers.
Unfinished business.
New business.
Election of officers.
Installation of officers.
Adjournment.

DECISIONS

16. The votes of a majority of the members present shall decide any questions, motion or resolution which shall be brought before the association, unless otherwise provided. Unless specifically provided herein otherwise, all discussions shall be governed by Robert's rules of order.

AMENDMENTS

17.† The By-Laws can be amended by a two-thirds vote of those present at any regularly called Executive Committee Meeting.

†Amended September 20, 1948.

DIRECTORY OF MEMBERS

as of February 1, 1958

(Figure after each name indicates year when member joined the association)

* Indicates Junior Member

HONORARY MEMBERS

Barnhart, E. H. (Retired) Div. Engr., B. & O., St. Petersburg, Fla. (1941)
Bechtelheimer, A. E., (Retired) Br. Engr., C. & N. W., Chicago, Ill. (1920)
Budd, Ralph, (Retired) President, C. B. & Q., Santa Barbara, Calif. (1927)
Buford, C. H. (Retired) President, C. M. St. P. & P., St. Petersburg, Fla. (1946)
Chinn, Armstrong, Pres., T. R. R. Assn. of St. L., St. Louis, Mo. (1930)
Crites, G. S., (Retired) Div. Engr., B. & O., Baltimore, Md. (1912)
Howard, N. D., Exec. Sec., A. R. E. A., Chicago, Ill. (1926)
Strate, T. H., (Retired), Div. Engr., C. M. St. P. & P., San Ysidro, Calif. (1918)
Vandenburgh, E. C., (Retired) Ch. Engr., C. & N. W., Chicago, Ill. (1925)

ACTIVE MEMBERS

A

Aaron, J. L., B. & B. Insp., W. M., Cumberland, Md. (1954)
Abel, N. M., Asst. Engr. Const., Penna., Trenton, N. J. (1957)
Adkins, H. O., Gen. Supv. B. & B., D. & R. G. W., Denver, Colo. (1953)
Albert, E. A., Steel Bridge Insp., I. C., Chicago, Ill. (1956)
Allen, J. P., Asst. Engr., Sou., Knoxville, Tenn. (1956)
Alley, F. T., Asst. B. & B. Supvr., St. L. S. W., Tyler, Texas (1955)
Anderson, A., Spec. Asst. Engr., N. Y. C., Chicago, Ill. (1947)
Anderson, A. C., Gen. B. & B. For., D. M. & I. R., Two Harbors, Minn. (1952)
Anderson, J. L., Supv. B. & B., M. P., Osawatomie, Kan. (1931)
Armstrong, W. F., Arch'l. Engr., C. & N. W., Chicago, Ill. (1947)
Arniel, W. R., Asst. Supv. Struc., Penna., Pittsburgh, Pa. (1953)
Askew, J. H., B. & B. Supvr., Sou., Atlanta, Ga. (1956)
Atkinson, T. J., Supv. of Struc., Penna., Pittsburgh, Pa. (1947)

B

Babbitt, J. H., Div. Engr., B. & O., Indianapolis, Ind. (1946)
Babcock, D. L., Supv. B. & B., C. & N. W., Fond du Lac, Wis. (1953)
Bach, S. A., Asst. B. & B. Supvr., M. P., Kansas City, Mo. (1955)
Bailey, R. W., Div. Eng., C. & N. W., Huron, S. D. (1957)
Baker, F. A., Asst. Gen. Bridge Insp., S. P., San Francisco, Calif. (1955)
Baker, R. C., Engr. of Struc., C. & E. I., Danville, Ill. (1940)
Baker, W. L., Supvr. W. S. & Wk. Equip., C. & E. I., Salem, Ill. (1956)
Bangs, E. L., Gen. Brdg. Insp. C. & N. W., Chicago, Ill. (1957)
Barhan, L. M., Asst. B. & B. Supvr., N. P., Minneapolis, Minn. (1956)
Barnes, J. A., Asst. to Ch. Eng., C. & N. W., Chicago, Ill. (1957)
Barr, H. L., Div. Engr., C. & N. W., Boone, Ia. (1938)
Barranco, S. H., Supvr. Str., P. R. R., Richmond, Ind. (1951)
Beam, Y. C., Mast. Carp., S. A. L., Americus, Ga. (1945)

Beatty, A. G., Supvr. Scales & Wk. Equip., C. & N. W., Chicago, Ill. (1957)
Beaver, J. F., Asst. Ch. Engr., Sou., Washington, D. C. (1950)
Becker, A. L., Eng. Str., M. P., St. Louis, Mo. (1957)
Bell, D. V., Mast. Carp., B. & O., Dayton, Ohio (1957)
Benson, G. W., Div. Engr., C. of G., Macon, Ga. (1940)
Benson, O. C., Asst. Eng. M. of W., B. & M., Boston, Mass. (1952)
Beringer, M. A., Br. Inspr., I. C., Chicago. Ill. (1929)
Bertel, D. J., Div. Engr., M. P., DeQuincy, La. (1957)
Beynon, H. G., B. & B. Mast., C. P., Brandon, Man., Can. (1951)
Billmeyer, E. D., Brdg. & Str. Eng., W. M., Baltimore, Md. (1955)
Bisbee, R. D., Div. Engr., P. & S. F., Slaton, Texas (1947)
Bishop, I. A., Asst. Mast. Carp., S. A. L., Savannah, Ga. (1955)
Black, A. R., Sp. Rep., S. P., Houston, Texas (1953)
Blake, J. E., Jr., Asst. Supv. Struc., Penna., Harrisburg, Pa. (1953)
Block, M., Asst. to Ch. Engr., I. C., Chicago, Ill. (1948)
Bober, H., B. & B. Engr., G. M. & O., Mobile, Ala. (1947)
Bodie, B. V., Gen. Mgr., G. M. & O., Mobile, Ala. (1951)
Boehling, H. A., Jr., Asst. Supv. B. & B., C. & O., Richmond, Va. (1948)
Boling, E. C., Supv. B. & B., N. S., Cary, N. C. (1950)
Bonnevier, C. J., Engr. Bldg., C. B. & Q., Chicago, Ill. (1957)
Booth, H. E., B. & B. Mast., C. N., Prince Albert, Sask., Canada (1957)
Borchert, W. C., Div. Engr., K. C. S., Shreveport, La. (1942)
Born, J. O., Eng. Str., M. C., Portland, Me. (1956)
*Bowen, R. L., Rodman, D. & H., Oneonta, N. Y. (1957)
Bowman, H. A., Mast. Carp., Ft. W. & D. C., Wichita Falls, Tex. (1953)
Bowman, R. M., Asst. Supvr. Str., P. R. R., Pittsburgh, Pa. (1954)
Bradfield, R. G., Engr., P. R. R., Chicago, Ill. (1957)
Brandimarte, J. J., Jr., Supvr. Str., P. R. R., Pittsburgh, Pa. (1947)
Bredfeldt, C., Ch. Drafts., C. M. St. P. & P., Chicago, Ill. (1955)
Brenton, G. W., Gen. Supvr. B. & B., D. & R. G. W., Denver, Colo. (1957)
Brice, W. T., B. & B. Mast., C. N., Regina, Sask., Can. (1946)
Broome, W. S., Asst. Ch. Engr., C. & S., Ft. W. & D., Denver, Colo. (1954)
Brouse, R. G., Mast. Carp., C. B. & Q., Chicago, Ill. (1951)
Brown, E. J., Ch. Engr., C. B. & Q., Chicago, Ill. (1955)
Brown, G. A., Gen. Fore., B. & B., A. T. & S. F., Wellington, Kan. (1953)
Brown, G. W., Water Serv. Supvr., T. & N. O., Houston, Texas (1955)
Brown, K. R., B. & B. Supvr., C. & E. I., Salem, Ill. (1956)
Brown, L. W., B. & B. Supv., C. & O., Peru, Ind. (1951)
Bruns, M. W., Brdg. Eng., T. R. R. A. of St. L., St. Louis, Mo. (1954)
Buckmaster, W. A., Asst. Div. Engr., B. & O. C. T., Chicago, Ill. (1951)
Budzenski, F. N., Gen. Fore., C. & N. W Antigo, Wis. (1938)
Bunch, A. H., Asst. Gen. Fore. B. & B. & W. S., St. L.-S. F., Ft. Scott, Kans. (1951)
Bunge, W. H., Asst. Eng., M. P., St. Louis, Mo. (1941)
Burch, E. E., Br. Engr., C. M. St. P. & P., Chicago, Ill. (1945)
Burford, A. E., Gen. For. B. & B., I. C., Memphis, Tenn. (1947)
Burkel, J. N., Draftsman, M. P., St. Louis, Mo. (1951)
Burner, P. D., Asst. Gen. Supv. Struc. & Wk. Eqpt., W. P., Oakland, Calif. (1953)
Burnette, W. M., B. & B. Supvr., G. S. & F., Valdosta, Ga. (1957)
Burrows, C. D., Mast. Carp., B. & O., Wilmington, Del. (1946)
Bush, R. H., W. S. Supv., T. & N. O., Ennis, Tex. (1952)

C

Caines, W. W., Supv. B. & B., C. & O., Huntington, W. Va. (1938)
Camelle, E. J., Asst. B. & B. Supv., T. & N. O., Houston, Tex. (1954)
Cameron, W. M., Ch. Carp., C. M. St. P. & P., Madison, Wis. (1955)
Campbell, H. G. Jr., Asst. Supvr. Str., P. R. R., Canton, Ohio (1956)
Campbell, J. E., Gen. Supv. M. of W. S. Weld., W. P., Lafayette, Calif. (1954)
Cantrell, C. F. Jr., B. & B. Gen. Fore., I. C., Vicksburg, Miss. (1956)
Carlson, A. W., Engr. of Brdg. & Str., W. P., San Francisco. Calif. (1955)
Carpenter, R. H., Dist. Eng., M. P., Little Rock, Ark. (1956)
Carter, J. W., B. & B. Supv., Virginian, Roanoke, Va. (1947)
Carter, T. S., Ch. Eng., M. K. T., Dallas Texas (1954)
Cary, N. M., Div. Engr., Sou., Valdosta, Ga. (1953)
Cash, E. E., Supv. M. W., Camas Prairie, Lewiston, Idaho (1953)
Chaffin, E. S., Supvr. B. & B., N. & W., Crewe, Va. (1957)
Chamberlain, H. L., Supvr. Str., P. R. R., Harrington, Del. (1956)
Chamberlain, P. C., Asst. to Engr. of Struc., Erie, Cleveland, Ohio (1941)

Chaney, A. B., Eng. M. of W., M. P., St. Louis, Mo. (1947)
Cheney, R. R., Asst. Supvr., Br. Mtce., C. M. St. P. & P., Chicago, Ill. (1953)
Cheselski, F. S., Asst. Mast. Carp., G. N., Grand Forks, N. D. (1956)
Clapper, K., Gen. Fore. B. & B., D. M. & I. R., Proctor, Minn. (1953)
Clark, K. L., Div. Engr., C. M. St. P. & P., Savanna, Ill. (1939)
Clarke, R. J., Eng. Str., P. R. R., Cincinnati, Ohio (1956)
Clise, W. E., Supv. B. & B., W. M., Frostburg, Md. (1953)
Clouette, H. F., Asst. B. & B. Supv., N. W. P., San Rafael, Calif. (1953)
Cole, G., B. & B. Gen. For., A. T. & S. F., Burlingame, Kan. (1949)
Collier, P. B., Supt. of Scales, M. P., St. Louis, Mo. (1938)
Collings, J. E., Ch. Carp., C. M. St. P. & P., Savanna, Ill. (1953)
Collum, R. L., Mast. Carp., S. A. L., Jacksonville, Fla. (1941)
Connor, J., Engr. Str., D. & H., Albany, N. Y. (1957)
Converse, D. W., Br. Engr. A. C. & Y., Akron, Ohio (1940)
Cook, E. F., W. S. For., M. P., Little Rock, Ark. (1947)
Cooledge, V. R., Engr. of Br., S. P., San Francisco, Calif. (1953)
Corbett, R. K., Asst. Gen. Fore., A. T. & S. F., San Bernardino, Calif. (1956)
Corporon, F. J., Supt. W. & Struc., C. S. S. & S. B., Michigan City, Ind. (1950)
Cothran, R. F., B. & B. Supvr., Sou., Valdosta, Ga. (1957)
Cox, R. C., B. & B. Supv., W. P., Sacramento, Calif. (1950)
Cox, W. R., Div. Engr., S. A. L., Americus, Ga. (1954)
Crane, J. C., Asst. B. & B. Supvr., S. P., Forest Grove, Ore. (1957)
Creed, T. F., Jr., Res. Engr. Bridge Dept., Sou., Washington, D. C. (1954)
Creek, C. W., Gen. Fore. B. & B., P. R. R., Pittsburgh, Pa. (1957)
Crespo, M. J., Asst. Design Engr., W. P., San Francisco, Calif. (1956)
Crews, C. H., Supv. B. & B., I. C., Jackson, Tenn. (1947)
Croft, P. H., Asst. Engr. M. of W., I. C., Memphis, Tenn. (1947)
Crouch, H. M., Wtr. Serv. Supv., T. & P., Bunkie, La. (1954)
Crounse, W. E., B. & B. Supvr., D. & H., Oneonta, N. Y. (1945)
Cruikshank, A. W., P. & H., Supvr., D. & H., Green Island, N. Y. (1950)
Cummings, E. M., Div. Eng., B. & O., Connellsville, Pa. (1954)
Curie, H. D., Mast. Carp., B. & O., Garrett, Ind. (1942)

D

Dahlberg, A. R., B. & B. Supvr., W. M., Hagerstown, Md. (1957)
Dal Cerro, N. J., Elec. Fore., P. R. R., Chicago, Ill. (1957)
David, J. J., Supvr. Auto. & Wk. Equip., T. & N. O., Victoria, Texas (1953)
Davidson, J. W., Asst. Brdg. Engr., C. B. & Q., Chicago, Ill. (1957)
Davis, H. E., Supvr. B. & B., N. Y. C. Sys., Mattoon, Ill. (1940)
Davis, L. H., Gen. For. B. & B., A. T. & S. F., Amarillo, Tex. (1948)
Day, F. D., Supv. Struc., Penna., New York, N. Y. (1949)
Defendorf, C. E., Asst. Ch. Eng., N. Y. C., Chicago, Ill. (1956)
DeMate, M. A., Str. Engr., St. L. S. F., Springfield, Mo. (1955)
Deno, L. J., Div. Engr., C. & N. W., Green Bay, Wis. (1947)
Derryberry, J. T., Gen. B. & B. Insp., W. M., Cumberland, Md. (1955)
Dick, H. M., Supv. of Struc., Penna., Harrisburg, Pa. (1942)
Dick, M. H., V. P. & Editor, Ry. Trk. & Str., Chicago, Ill. (1937)
Dickison, C. S., Supvr. B. & B., C. & O., South Shore, Ky. (1953)
Dimick, C. A., Supvr. B. & B., N. Y. C., Boston, Mass. (1957)
Dixon, C. E., Asst. Supvr. B. & B., M. C., Portland, Me. (1955)
Dixon, N., B. & B. Mast., C. N., Montreal, Que., Can. (1949)
Dobbie, J. E., B. & B. Mast., C. P., Vancouver, B. C., Can. (1953)
Dodson, F., Asst. Supv. B. & B., C. & O., Covington, Ky. (1948)
Dove, R. E., Assoc. Ed., Ry. Trk. & Struc., Chicago, Ill. (1934)
Duchac, J. V., Supv. B. & B., C. & N. W., Antigo, Wis. (1927)
Duffy, P. E., Asst. Supvr. B. & B., G. N. Grand Forks, N. D. (1957)
Dunn, W. M. S., Staff Engr., C. & O., Huntington, W. Va. (1957)
Duresky, F., Jr., Supv. B. & B., C. & N. W., Huron, S. D. (1942)
Dysinger, M. A., Asst. Eng., Southern, Washington, D. C. (1956)

E

Eargle, J. M., Mast. Carp., S. A. L., Atlanta, Ga. (1953)
Eble, A. E., Tr. Mast., St. L. S. W., Texarkana, Texas (1953)
Edlund, O. F., Supv. of W. S. & Equip., B. Ry. Co. of C., Chicago, Ill. (1950)
Eichenlaub, C. M., Res. Engr., S. D. & A. E., San Diego, Calif. (1943)

Eitel, R. A., Gen. Brdg. Insp., C. R. R. of N. J., Plainfield, N. J. (1954)
Ellerbrock, D. T., Mast. Carp., B. & O., Indianapolis, Ind. (1956)
Elliott, C. E., Engr. Trk., W. P., San Francisco, Calif. (1950)
Ellis, J. S., Asst. Supvr. B. & B., C. & O., Hinton, W. Va. (1957)
Ellis, P. O., Asst. Ch. Eng.-M., M-K-T., Dallas, Texas (1954)
Elower, L., Trav. Br. Insp., Erie, Owego, N. Y. (1948)
Enderle, R. E., Div. Eng., B. & O., Garrett, Ind. (1955)
Enger, E. M., Supv. B. & B., C. St. P. M. & O., St. Paul, Minn. (1947)
Erickson, H. G., Ch. Engr., L. A. J., Los Angeles, Calif. (1953)
Erickson, O., Asst. B. & B. Supv., S. P., Sacramento, Calif. (1950)

F

Ferry, M. H., Mast. Carp., Erie, Hornell, N. Y. (1952)
Fest, C., Sr. Asst. B. & B. Supvr., S. P., Milwaukie, Ore. (1957)
Firehammer, L. M., Supv. B. & B., Ill. Term., Springfield, Ill. (1919)
Fisher, D. H., Supvr. Brdg. Maint., C. M. St. P. & P., Chicago, Ill. (1952)
Flayhart, C. J., Insp. M. W., P. R. R., Williamsport, Pa. (1956)
Fobes, E. E., Supvr. B. & B., N. Y. C., Syracuse, N. Y. (1957)
Foreman, J. E., Jr., Supvr. Str., B. & L. E., Butler, Pa. (1957)
Forseth, C. E., Div. Engr., W. P., Sacramento, Calif. (1950)
Fort, O. E., Asst. Ch. Engr.-Maint., St. L.-S. F., Springfield, Mo. (1957)
Foster, C. B., B. & B. Supvr., Sou., Greensboro, N. C. (1954)
Fox, J., Eng. M. of W., Q. C., Sherbrooke, P. Q., Can. (1956)
Fox, R. L., Proc. Engr.-Str., Sou, Washington, D. C. (1935)
Franzen, E. T., Engr. of Brdg., C. R. I. & P., Chicago, Ill. (1957)
Frederickson, N. H., Supvr. W. S., I. C., Memphis, Tenn. (1956)
Freseman, C. J., Div. Engr., C. & N. W., St. Paul, Minn. (1957)
Friets, C. G., Supvr. B. & B., C. & N. W., Excanaba, Mich. (1957)
Fritzinger, G. F., Asst. Engr., Wabash, St. Louis, Mo. (1957)
Fronabarger, H. C., (Ret.) B. & B. Supvr., T. & P., Fort Worth. Texas (1949)
Frost, L. M., Supv. B. & B., G. T. W., Battle Creek, Mich. (1938)
Fuhr, W. E., Prin. Asst. Engr., C. M. St. P. & P., Chicago, Ill. (1948)

G

Gabrio, C. W., Engr. of Str., Virginian, Norfolk, Va. (1947)
Gamble, H. H., Asst. B. & B. Supvr., B. & M., Concord, N. H. (1957)
Gannon, J. P., Div. Engr., M. St. P. & S. S. M., Stevens Point, Wis. (1947)
Garcelon, C. E., B. & B. Supt., B. & A., Houlton, Me. (1945)
Garland, E. F., Br. Supv., N. O. P. B., New Orleans, La. (1953)
George, S. W., Div. Engr., W. M., Cumberland, Md. (1956)
Gillespie, W. G., Mast. Carp., B. & O., Grafton, W. Va. (1946)
Gilmore, R. W., Gen. Br. Insp., B. & O., Cincinnati, Ohio (1943)
Gipson, C. G., Gen. Fore. B. & B. - W. S., A. T. & S. F., Winslow, Ariz. (1956)
Gladwin, F. E., B. & B. Supv., N. W. P., San Rafael, Calif. (1950)
Goforth, J. A., Maint. Engr., Clinchfield, Erwin, Tenn. (1954)
Gogl, E. U., B. & B. Supvr., S. P., El Paso, Texas (1955)
Gossard, J. T., Supv. B. & B., W. M., Hagerstown, Md. (1952)
Gottsabend, W. J., Asst. Supvr. Str., P. R. R., Columbus, Ohio (1957)
Graham, W. R., Supvr. B. & B., C. & O., Covington, Ky. (1946)
Granger, R. W., Asst. Engr., A. C. & Y., Akron, Ohio (1953)
Grant, J. A., Asst. to Div. Engr., B. & O., Indianapolis, Ind. (1956)
Green, C. C., Mast. Carp., B. & O., Wheeling, W. Va. (1953)
Griffis, T. W., B. & B. Insp., N. Y. C. & St. L., Cayuga, Ind. (1954)
Griffith, J. E., Asst. Ch. Engr., M. of W. & Str., Sou., Knoxville, Tenn. (1957)
Groner, B. H., Drainage Engr. - Brdg. Dept., I. C., Chicago, Ill. (1957)
Gunderson, R. R., Eng. Maint. of W., W. M., Baltimore, Md. (1947)
Gustafson, J. M., Br. Engr., M. & St. L., Minneapolis, Minn. (1949)

H

Haase, E. H., B. & B. Supv., S. P., Oakland Pier #7, Calif. (1954)
Hagenmaier, C. E., Asst. B. & B. Supv., S. P., Los Angeles, Calif. (1950)
Haines, P. D., B. & B. Supv., C. & O., Saginaw, Mich. (1943)
Hall, J. H., Asst. Div. Engr., Sou., Atlanta, Ga. (1955)
Hamilton, A. R. G., B. & B. Mast., C. N., Hornepayne, Ont., Canada (1957)
Hamilton, C. W., Engr. of Design, Wabash, St. Louis, Mo. (1950)
Hamilton, W. A., Jr., Asst. Engr., G. C. & S. F., Galveston, Texas (1955)
Hampton, A. A., B. & B. Supvr., M. P., De Quincy, La. (1947)
Hancock, J. S., Br. Engr., D. T. & I. R., Dearborn, Mich. (1916)
Hanna, V. C., Ch. Engr., T. R. R. A. of St. L., St. Louis, Mo. (1953)

Hansen, A. E., Ch. Carp., C. M. St. P. & P., Tacoma, Wash. (1954)
Harding, W. G., Arch., Wabash, St. Louis, Mo. (1957)
Harlow, H. M., Asst. Gen. Supv. B. & B., C. & O., Richmond, Va. (1939)
Harper, W. B., Supv. Trk., I. C., Vicksburg, Miss. (1953)
Harris, A. R., Engr. Br., C. & N. W., Chicago, Ill. (1940)
Hartley, L. M., Mast. Carp., S. A. L., Tampa, Fla. (1949)
Harwood, M. S., Asst. B. & B. Supvr., S. P., San Mateo, Calif. (1948)
Hawley, I. H., Asst. Engr., C. & I. M., Springfield, Ill. (1957)
Hayes, J. W., Arch., G. N., St. Paul, Minn. (1957)
Healy, J. J., Asst. Div. Engr., B. & M., Boston, Mass. (1947)
Heck, J. E., Supvr. B. & B., C. & O., Ashland, Ky. (1938)
Hecker, R. L., B. & B. & W. S. Supvr., C. & O., Plymouth, Mich. (1947)
Hedley, W. J., Ch. Engr., Wabash, St. Louis, Mo. (1950)
Hefte, A., Asst. B. & B. Supv., N. W. P., San Rafael, Calif. (1952)
Heinlen, R. H., Div. Engr., G. C. & S. F., Ft. Worth, Texas (1957)
Hellickson, D. E., Mast. Carp., G. N., Whitefish, Mont. (1954)
Hellweg, R. D., Asst. Div. Engr., G. M. & O., Bloomington, Ill. (1947)
Hendrix, W. P., Engr. B. & B., P. R. R., Philadelphia, Pa. (1954)
Herbort, W. F., Asst. Supv. Str., P. R. R., Buffalo, N. Y. (1957)
Hickok, B. M., Supv. B. & B., N. Y. C., Cleveland, Ohio (1951)
Hillman, A. B., Ch. Engr., B. Ry. Co. of C., & C. & W. I., Chicago, Ill. (1942)
Hillman, W. C., Mast. Carp., Clinchfield, Erwin, Tenn. (1953)
Hiner, J. T., Asst. Ch. Engr., Sou., Cincinnati, Ohio (1950)
Hinkel, E. H., Mast. Carp., Reading, Tamaqua, Pa. (1957)
Hinsch, L. C., Ch. Carp., C. M. St. P. & P., Aberdeen, S. D. (1957)
Hobson, J. A., Asst. Water Serv. Fore., St. L.-S. F., Amory, Miss. (1957)
Hodgson, A. W., Ch. Carp., C. M. St. P. & P., Butte, Mont. (1955)
Hoffman, E. L., Div. Engr., C. & N. W., Norfolk, Nebr. (1957)
Hofstetter, P. W., Asst. B. & B. Supv., M. P., San Antonio, Tex. (1946)
Holmes, E. J., Mast. Carp., Erie, Huntington, Ind. (1952)
Hopton, J. P., Engr. of Maint., C. U. T., Cincinnati, Ohio (1955)
Hornig, F. F., Div. Engr., C. M. St. P. & P., Austin, Minn. (1947)
Hotard, A. E., Asst. Brdg. Engr., L. & N., Louisville, Ky. (1953)
Howard, J. G., Project Supvr., W. P., Sacramento, Calif. (1953)
Howard, P. D., R. R. Supvr., Minnesota Mining & Mfg. Co., St. Paul, Minn. (1957)
Howard, W. A., Asst. B. & B. Supvr., T. & N. O., Ennis, Texas (1957)
Hoyt, A. C., Engr. B. & B., E. J. & E., Joliet, Ill. (1947)
Hubbard, M. J., Asst. Ch. Eng., C. & O., Richmond, Va. (1948)
Huckaby, V. T., Maint. Engr., M.-K.-T., Parsons, Kans. (1947)
Huffman, W. H., Asst. Ch. Engr., C. & N. W., Chicago, Ill. (1941)
Hull, F. G., B. & B.-W. S. Supvr., C. & O., Blemheim, Ont., Canada (1957)
Humphreys, R. W., Prin. Asst. Eng., N. P., St. Paul, Minn. (1947)
Humphries, A. G., Water Serv. Engr., S. P., San Francisco, Calif. (1955)
Huntsman, W. J., Supvr. Str., D. & R. G. W., Grand Junction, Colo. (1957)
Hutcheson, F. W., Supv. B. & B., C. & O., Newport News, Va. (1938)
Hutcheson, W. A., Supv. Wk. Equip., C. & O., Clifton Forge, Va. (1939)
Hutchings, V. W., B. & B. Supvr., S. P., Bakersfield, Calif. (1941)
Hutchinson, D. G., B. & B. Insp., W. P., Sacramento, Calif. (1950)
Hutchison, W. D., Asst. Div. Eng., C. N., Ottawa, Ont., Can. (1956)
Hutto, J. E., Res. Engr., S. A. L., Savannah, Ga. (1951)

I

Inabinet, J. V., Gen. Br. Insp., S. A. L., Jacksonville, Fla. (1948)
Ingram, J. L., Struc. Drafts., T. R. R. A. of St. L., St. Louis, Mo. (1954)

J

Jackman, H. E., Mast. Carp., B. & O., Chillicothe, Ohio (1944)
Jackson, S. M., Spec. Engr. Oil & Gas Dev., M. P., St. Louis, Mo. (1951)
Jackson, T. E., Gen. B. & B. Supv., S. P., San Francisco, Calif. (1942)
Jarratt, M., W. & F. Supv., S. P., Tucson, Ariz. (1950)
Jenkins, H. W., Asst. Ch. Engr., N. Y., N. H. & H., New Haven, Conn. (1940)
Jenkins, R. W., Str. Engr., St. L.-S. F., Springfield, Mo. (1955)
Johnson, A. C., Asst. Ch. Engr., E. J. & E., Joliet, Ill. (1944)
Johnson, B. L., B. & B. Mast., C. N., Winnipeg, Man., Canada (1957)
Johnson, B. O., Off. Engr., C. M. St. P. & P., Chicago, Ill. (1931)
Johnson, D. H., Supvr. B. & B., C. St. P. M. & O., Eau Claire, Wis. (1940)
Johnson, E. A., Engr. of Br., I. C., Chicago, Ill. (1953)

Johnson, E. M., Asst. Div. Rdm., D. M. & I. R., Virginia, Minn. (1956)
Johnson, G. C., B. & B. Supvr., C. & N. W., Green Bay, Wis. (1955)
Johnson, H., Asst. Engr., C. M. St. P. & P., Chicago, Ill. (1957)
Johnston, G. H., Gen. For. B. & B., A. T. & S. F., Marceline, Mo. (1950)
Jones, A. C., B. & B. Supv., Southern, Birmingham, Ala. (1938)
Jones, E. B., Supvr. B. & B., C. & O., Clifton Forge, Va. (1945)
Jones, F. Gen. For. B. & B., & W. S., St. L. - S. F., Chaffee, Mo. (1952)
Jorlett, J. A., Engr. Str., P. R. R., Baltimore, Md. (1946)

K

Kaullen, W. C., B. & B. Supv., M. P., Kansas City, Mo. (1953)
Kelly, G. E., W. & F. Supvr., S. P., Bakersfield, Calif. (1953)
Kelly, J. R., B. & B. Supv., Southern, Lexington, Ky. (1952)
Kendall, J. T., Asst. Supvr. Str., P. R. R., Cleveland, Ohio (1949)
Kenyon, J. R., Gen. B. & B. Supvr., N. Y., N. H. & H., New Haven, Conn. (1955)
Klouda, R. G., Draftsman, C. M. St. P. & P., Chicago, Ill. (1956)
Knapp, P., Mast. Carp., Erie, Jersey City, N. J. (1951)
Koehler, P. L., Supt. Simp. Transp. Dept., C. & O., Huntington, W. Va. (1938)
Koenig, M. E., Div. Engr., C. St. P. M. & O., St. Paul, Minn. (1957)
Kolstad, G. H.,Asst. Supvr. B. & B., G. N., Willmar, Minn. (1957)
Krefting, A. S., Asst. Ch. Engr., M. St. P. & S. S. M., Minneapolis, Minn. (1935)
Kruse, H. H., Ch. Carp., C. M. St. P. & P., St. Paul, Minn. (1957)
Kvenberg, S. E., Supvr. Bldg. Maint., C. M. St. P. & P., Chicago, Ill. (1932)

L

LaBat, J. J., B. & B. Supvr., M. P., Wichita, Kans. (1955)
Lane, J. R., Asst. Engr. Brdgs., Sou., Atlanta, Ga. (1957)
Langan, G., Gen. Fore. B. & B., P. R. R., Pittsburgh, Pa. (1957)
Langlois, J. E. R., Assr. B. & B. Mast., C. N., Laviolette, Que., Canada (1957)
Larson, K., Supvr. B. & B., C. & N. W., Sioux City, Ia. (1957)
Larson, L. M., Asst. B. & B. Supvr., G. N., Superior, Wis. (1957)
Latimer, J. A., Asst. Gen. Fore. B. & B. & W. S. Dept., St. L.-S. F., Springfield, Mo. (1957)
Laurick, M. J., Asst. Supvr. Str., P. R. R., Ft. Wayne. Ind. (1952)
Lawrence, E. J., Brdg. Insp., N. Y. C., Springfield, Mass. (1957)
Layman, D. C., Gen. B. & B. Fore., I. C., Memphis, Tenn. (1952)
Layman, W. E., Gen. Fore. B. & B., I. C., Carbondale, Ill. (1954)
Leach, A. L., Asst. Eng. of Brdg., I. C., Chicago, Ill. (1955)
Leak, V. L., Gen. For. B. & B. & W. S., St. L. - S. F., Tulsa, Okla. (1948)
LeClaire, N. C., Supt. B. & B., T. R. R. A., of St. L., St. Louis, Mo. (1952)
Lehman, H. G., B. & B. Supv., S. P., Tucson, Ariz. (1950)
Leinweber, F. J., B. & B. Mast., C. N., St. Thomas, Ont., Canada (1947)
Lieser, H. J., Supvr. B. & B., C. & W. I., Chicago, Ill. (1948)
Lingle, T. N., Supvr., B. &. B., I. C., Carbondale, Ill. (1951)
Linn, G. A., Div. Engr., C. & N. W., Chadron, Neb. (1940)
Little, H. C., Supvr. Wat. Serv., I. C., New Orleans, La. (1948)
Lokotzke, G. P., Supv. B. & B., E. J. & E., Gary, Ind. (1947)
Lorber, R. J., Supv. B. & B., P. & P. U., Peoria, Ill. (1948)
Lowry, J. M., Ch. Engr., St. L. S. W., Tyler, Tex. (1950)
Lucas, H. F., Asst. Engr., C. M. St. P. & P., Chicago, Ill. (1952)
Luce, W. L., Mast. Carp., Erie, Youngstown, Ohio (1952)
Luck, R. P., Draftsman, C. & N. W., Chicago, Ill. (1920)
Lund, C. V., Asst. to Ch. Eng., C. M. St. P. & P., Chicago, Ill. (1947)
Lundgren, H. M., Asst. B. & B. Mast., C. N., Kamloops, B. C., Canada (1957)
Lyon, L. E., Div. Engr., S. P., Tucson, Ariz. 1947)

Mc

McCall, H. W., Ch. Carp., C. M. St. P. & P., Miles City, Mont. (1955)
McCauley, M. L., Asst. Brdg. Engr., N. Y. C., New York, N. Y. (1950)
McCollum, P. K., Bldg. Insp., I. C., Memphis, Minn. (1955)
McDermott, A. A., B. & B. Supv., S. P., Dunsmuir, Calif. (1945)
McDiarmid, R. J., Supvr. B. & B., E. J. & E., Joliet, Ill. (1957)
McDonald, J. W., Gen. For. B. & B. & W. S., St. L. - S. F., Springfield, Mo. (1947)
McElreath, C. S., B. & B. Supvr., Sou., Atlanta, Ga. (1951)
McFadden, W. E., Ch. Carp., C. M. St. P. & P., Milwaukee, Wis. (1955)
McGee, M. A., Div. Engr., L. & N., Ravenna, Ky. (1954)
McGlothlin, J. W., Div. Engr., C. M. St. P. & P., Aberdeen, S. D. (1955)
McGrew, B. H., Supv. B. & B., St. L. S. W., Tyler, Tex. (1951)
McGrew, F. O., Ch. Carp., C. M. St. P. & P., La Crosse, Wis. (1948)
McIver, J., B. & B. Supvr., N. S., Edenton, N. C. (1956)

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McKenney, C. E., System Scale Insp., N. Y. C. & St. L., Ft. Wayne, Ind. (1956)
McKibben, D. H., Supvr. Str., P. R. R., Columbus, Ohio (1951)
McMillan, R. J., B. & B. Mast., C. N., Kamloops, B. C. Canada (1957)
McMillen, J. W., Off. Engr., T. R. R. A. of St. L., St. Louis, Mo. (1954)
McPherson, J. W., Asst. Div. Engr., Sou., Greenville, S. C. (1957)

M

MacQuarrie, A. C., B. & B. Mast., C. N., New Glasgow, N. S., Canada (1957)
Madson, H. C. (Ret.) Designer, C. & N. W., Ames, Iowa (1940)
Malmberg, C. R., Supvr. B. & B., C. & N. W,. Norfolk, Nebr. (1957)
Malone, J. W., Asst. Engr., Wabash, St. Louis, Mo. (1957)
Manning, D. A., Supv. B. & B., C. & N. W., Chicago, Ill. (1939)
Manson, A., Div. Engr., L. & N., Birmingham, Ala. (1957)
Manter, E. E., Supvr. B. & B., M. C. Bangor, Me. (1955)
Martens, W. F., Gen. For. B. & B., A. T. & S. F., San Bernardino, Calif. (1924)
Martin, J. D., Ch. Carp., C. M. St. P. & P., Sioux City, Iowa (1955)
Martin, J. W., Asst. Mast. Carp., S. A. L., Tampa, Fla. (1953)
Martin, S. L. Asst. B. & B. Supv., T. & N. O., LaFayette, La. (1951)
Mason, E. L., B. & B. Supv., M. P., Kingsville, Tex. (1946)
Mason, S. K., Ch. Engr., T. M., Laredo, Tex. (1950)
Mateer, W. G., Mgr. of Pur. & Stores, E. J. & E., Chicago, Ill. (1944)
Mathis, R. C., Br. Insp., I. C., Memphis, Tenn. (1947)
Matthews, H. A., Gen. For. B. & B. & W. S., St. L. - S. F., Amory, Miss. (1949)
Matthews, W. L., Sr. Asst. B. & B. Supv., S. P., Tucson, Ariz. (1953)
Mayfield, L., Res. Eng. M. P., St. Louis, Mo. (1944)
Mays, J. W. N., Engr. Str., P. R. R., Pittsburgh, Pa. (1947)
Meeks, W. R., B. & B. Supv., M. P., Falls City, Neb. (1942)
Meeth, P. W., B. & B. Insp., St. L. -S. F., Springfield, Mo. (1957)
Melton, H. W., B. & B. Supvr., G. N., Seattle, Wash. (1957)
Meredith, W. E., Supvr. Str., P. R. R., Canton, Ohio (1950)
Merrill, B. W., Supv. B. & B., N. Y. C. & St. L., Conneaut, Ohio (1936)
Meserve, E. S., Supvr. B. & B., B. & M., Dover, N. H. (1949)
Messman, D. V., Engr. of Bdgs., Southern, Knoxville, Tenn. (1955)
Mettlach, P. A., B. & B. Fore., G. B. & W., Arcadia, Wis. (1956)
Meyers, B. R., Ch. Engr., C. & N. W., Chicago, Ill. (1930)
Midkiff, R. B., Ch. Engr., M. W. & S., Sou., Knoxville, Tenn. (1953)
Miesenhelder, P. D., Concrete Engr. Research Staff - A.A.R., Chicago, Ill. (1952)
Miller, R. H., Asst. Eng., L. S. & I., Marquette, Mich. (1953)
Milne, A. P., Supv. B. & B., N. Y. C. & St. L., Frankfort, Ind. (1953)
Mitchell, D. N., Asst. Supv. B. & B., C. & O., Newport News, Va. (1948)
Molinari, V. N., Off. Engr., D. & H., Albany, N. Y. (1957)
Moline, R. F., Asst. Brdg. Eng., D. T. & I., Dearborn, Mich. (1956)
Montague, C. F., Supt. M. W. Equip., P. R. R., Philadelphia, Pa. (1953)
Moore, A. J., Br. Insp., M. P., Eunice, La. (1950)
Moore, H. R., Ch. Eng. M. W. & S., Sou., Charlotte, N. C. (1956)
Moore, H. S., B. & B. Mast., C. P., Revelstoke, B. C. Can. (1954)
Moore, I. A., Ch. Engr., C. & E. I., Danville, Ill. (1937)
Moore, J. D., Engr. Str., P. R. R., Indianapolis, Ind. (1953)
Moreland, H. B., B. & B. Supv., Southern, Wilton, Ala. (1951)
Morgan, C. E., Asst. B. & B. Supvr., T. & N. O., San Antonio, Texas (1954)
Morgan, L. R., Asst. Res. Engr. Str., A. A. R., Chicago, Ill. (1937)
Moris, R. F., B. & B. Supvr., N. Y., C. & St. L., Ft. Wayne, Ind. (1955)
Morris, A. A., Mast. Carp., B. & O., Washington, Ind. (1957)
Morris, C. L., Asst. Supvr. B. & B., L. & N., Mobile, Ala. (1957)
Morris, C. R., Asst. B. & B. Supvr., N. P., Tacoma, Wash. (1957)
Morrison, R. H., Ch. Engr., L. S. & I., Marquette, Mich. (1941)
Morrissey, J. K., Supvr. M. of W. Reports, C. & O., Richmond, Va. (1955)
Moser, C. A., B. & B. Supvr., S. N. & T. S., Sacramento, Calif. (1951)
Moser, C. L., B. & B. Supvr., Southern, Asheville, N. C. (1955)
Mottier, C. H., Vice Pres., I. C., Chicago, Ill. (1942)
Mouhot, P. T., B. & B. Supv., T. & N. O., Lafayette, La. (1952)
Murray, D. J., Engr. Dftsman, C. & W. I.-B. Ry. of C., Chicago, Ill. (1954)
Myers, E. T., Asso. Editor, Modern R. Rs., Chicago, Ill. (1957)
Myers, R. L., Supv. W. S., I. C., Clarksdale, Miss. (1950)

N

Neal, G. W., Supt., Chattahoochee Valley, West Point, Ga. (1948)

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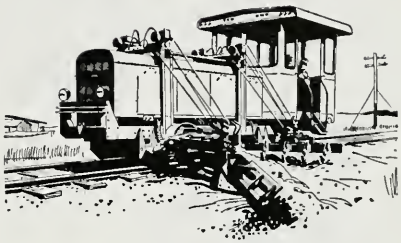

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MOTOR CAR ACCESSORIES	TIE BED SCARIFIERS
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Nelson, R. D., Asst. Div. Engr., C. & N. W., Boone, Iowa (1957)
Neutts, F. T., Asst. Engr., D. & H., Albany, N. Y. (1957)
Nicely, O. P., Asst. Supv. B. & B., C. & O., Clifton Forge, Va. (1950)
Nichols, J. C., Br. Engr., L. & N., Louisville, Ky. (1954)
Nichols, R. E., Asst. Gen. Fore. B. & B., St. L.-S. F., Amory, Miss. (1957)
Nilan, W. J., Asst. Gen. B. & B. Supvr., N. Y., N. H. & H., New Haven, Conn. (1956)
Norris, H. Asst. Supv. B. & B., F. E. C., Miami, Fla. (1948)
Norris, M., B. & B. Mast., D. & H., Oneonta, N. Y. (1957)
Norton, R. L., Mast. Carp., S. A. L., Savannah, Ga. (1951)

O

O'Brien, J. B., Asst. Supvr. B. & B., C. & O., Richmond, Va. (1954)
Odgers, F. T., Asst. B. & B. Supvr., S. P., Portland, Oreg. (1955)
Oest, W. C., Prin. Asst. Engr., Ft. W. & D., Ft. Worth, Tex. (1947)
Ogle, H., Bridge Insp., C. & E. I., Salem, Ill. (1956)
O'Keefe, F. J., Gen. Fore. B. & B., P. R. R., Jonstown, Pa. (1957)
Olson, O. D., B. & B. Supv., C. & N. W., Chicago, Ill. (1953)
Olson, V. E., B. & B. Supv., M. St. P. & S. S. M., Stevens Point, Wis. (1948)
Ornburn, B. J., Asst. Ch. Engr. Struct., C. M. St. P. & P., Chicago, Ill. (1948)
Ostrom, W. D., Ch. Carp., C. M. St. P. & P., Chicago, Ill. (1954)
Ovardits, K., Asst. Engr., N. Y. C., Chicago, Ill. (1953)
Owens, B. H., Supvr. B. & B., I. C., Vicksburg, Miss. (1956)

P

Packard, B. G., Office Engr., C. & N. W., Chicago, Ill. (1954)
Pahl, W. H., Jr., Supvr. Str., P. R. R., Cleveland, Ohio (1950)
Parrish, E. L., Div. Engr., I. C., Vicksburg, Miss. (1947)
Patrick, F. V., B. & B. Supv., Southern, Knoxville, Tenn. (1954)
Patterson, C. A., B. & B. Supvr., T. P. & W., Washington, Ill. (1955)
Patterson, J. M., Supvr. B. & B., N. Y. C., Weehawken, N. J. (1957)
Patterson, R. H., Asst. to Ch. Engr., St. L. S. W. Tyler, Texas (1955)
Pearce, J. R., Supvr. B. & B., L. & N., Latonia, Ky. (1957)
Pearson, A. H., Mast. Carp., C. B. & Q., St. Joseph, Mo. (1952)
Pease, B. W., Asst. Supvr. B. & B., M. C., Bangor, Me. (1957)
Pederson, W. E., B. & B. Supv., M. St. P. & S. S. M., Superior, Wis. (1950)
Peek, J. M., Asst. Div. Engr., Sou., Knoxville, Tenn. (1951)
Perrier, J. L., Div. Engr., C. & N. W., Chicago, Ill. (1953)
Perrine, D. E., Asst. Ch. Engr., C. & W. I., Belt Ry. Co. of Chgo., Chicago, Ill. (1953)
Perry, C., Asst. Supv. B. & B., C. & O., Ashland, Ky. (1950)
Peterson, H. R., Ch. Engr., N. P., St. Paul, Minn. (1953)
Peterson, J. C., Sr. Asst. B. & B. Supv., S. P., Sacramento, Calif. (1950)
Peterson, N. E., Ch. Engr., C. & I. M., Springfield, Ill. (1938)
Petteys, W. F., Div. Engr., Erie, Hornell, N. Y. (1948)
Pfeiffer, A., Asst. B. & B. Supvr., S. P., Stockton, Calif. (1939)
Phelps, C. E., B. & B. Supvr., A. & W. P.-W. of A. & Ga. RR., Decatur, Ga. (1949)
Phillips, E. L., Mast. Carp., C. B. & Q., Casper, Wyo. (1953)
Phillips, L., B. & B. Insp., W. M., Cumberland, Md. (1957)
Piepmeier, A. L., Asst. Ch. Eng., C. G. W., Oelwein, Ia. (1953)
Pocino, E. A., Gen. Fore. B. & B., P. R. R., Princeton Jct., N. J. (1955)
Podas, N. F., Ch. Engr., St. P. U. D. Co. & M. T. Ry. Co., St. Paul, Minn. (1937)
Potts, G. W., Asst. Supvr., B. & B., L. & N., Knoxville, Tenn. (1957)
Potts, H. F., Supvr. Str., P. R. R., Fort Wayne, Ind. (1957)
Pound, E. R., Mast. Carp., B. & O., Newark, Ohio (1952)
Preston, C. W., Engr. Prot. Coatings, B. & O,. Baltimore, Md. (1950)
Price, A. C., B. & B. Master, C. P., London, Ont., Can. (1953)
Pritchard, N. L., Off. Engr., A. T. & S. F., Clovis, N. Mex. (1956)
Prober, H. W., B. & B. Gen. Fore., S. P., Azusa, Calif. (1957)
Prude, G. F., Supv. B. & B., T. & N. O., Houston, Tex. (1951)
Pryor, W. H. (Ret.), Gen. Fore. B. & B. & W. S., St. L. - S. F., Memphis, Tenn. (1946)
Pyle, T. V., Engr. of Design, E. J. & E., Joliet, Ill. (1954)

R

Raessler, V. D., Supv. B. & B., I. C., Memphis, Tenn. (1951)
Rainey, W. H., B. & B. Supvr., T. & N. O., San Antonio, Texas (1956)
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Rasmussen, L. B., Supvr. Str., P. R. R., Williamsport, Pa. (1954)
Raver, H. E., Engr. B. & B., L. I., Jamaica, N. Y. (1952)
Reed, T. C., Asst. Brdg. Insp., L. & N., Louisville, Ky. (1954)
Reese, C. M., Gen. Fore. B. & B., G. C. & S. F., Temple, Tex. (1953)
Reid, R. H., Asst. Supvr. B. & B., C. & O., Peru, Ind. (1955)
Rice, E. D., B. & B. Supv., C. & E. I., Danville, Ill. (1949)
Richardson, F. L., Asst. Gen. Fore. B. & B. & WS., St. L-S. F., Enid, Okla. (1957)
Ridgeway, J. J., Supvr. Str., B. & L. E., Greenville, Pa. (1957)
Rieser, D. A., Asst. Engr., C. M. St. P. & P., Chicago, Ill. (1956)
Riffle, L. F., Ch. Carp., C. M. St. P. & P., Perry, Ia. (1956)
Robbins, C. W., Div. Eng., M. K. T., Smithville, Texas (1954)
Roberts, J. T., Asst. Div. Engr., Sou., Bristol, Va. (1956)
Robinson, G. E., Asst. Ch. Engr., N. Y. C., New York, N. Y. (1948)
Robinson, N. R., B. & B. Supv., S. P., Sacramento, Calif. (1934)
Rode, L. A., Gen. Br. Insp., Erie, Newark, N. J. (1948)
Ross, J. E., B. & B. Insp., St. L.-S. F., Amory, Miss. (1957)
Rothell, R. D., Asst. Trk. Supvr., Sou., Westminster, S. C. (1957)
Rust, R. B., Jr., B. & B. Supvr., Sou., Lexington, Ky. (1957)
Routenberg, H. W. (Retired), Mast. Carp., B. & O., Baltimore, Md. (1946)
Rowland, J. W., Supvr. Str., L. I., Jamaica, N. Y. (1956)
Rumke, R. W., Asst. Eng., Sou., Washington, D. C. (1956)
Russell, C. E., Supv. W. S., I. C., Chicago, Ill. (1953)
Rymer, J. R., Div. Engr., B. & O., Chicago, Ill. (1957)

S

Safley, J. R., B. & B. Supv., S. P., San Mateo, Calif. (1945)
Salmon, J. M., Jr., Ch. Engr., Clinchfield, Erwin, Tenn. (1938)
Sarris, P. T., Trk. Supvr., Sou., Valdosta, Ga. (1955)
Sathre, C. O., B. & B. Supv., C. & N. W., Madison, Wis. (1950)
Saunders, H. M., Supv. B. & B., C. & O., Richmond, Va. (1954)
Saunders, T. D., Ch. Engr., O. N., North Bay, Ont., Can. (1930)
Saurer, D. E., Asst. Supv. Struct., Penna., Logansport, Ind. (1951)
Savage, F. E., Asst. B. & B. Supvr., N. P., Minneapolis, Minn. (1957)
Sawyer, J. H., Jr., Ch. Engr., C. G. W., Oelwein, Ia. (1951)
Schlaf, E. R., Asst. Supt. W. S., I. C., Chicago, Ill. (1947)
Schmidl, R. M., Editor, Railway Purchases & Stores, Chicago, Ill. (1956)
Schoener, J. T., Asst. Engr. Str., M. P., St. Louis, Mo. (1957)
Scites, P. E., Asst. Supvr. B. & B., C. & O., Huntington, W. Va. (1950)
Scroggin, D. R., Jr., Engr., C. S. S. & S. B., Michigan City, Mich. (1953)
Seals, R. K., Div. Engr., Southern, Greensboro, N. C. (1951)
Seely, W. L., Asst. Engr., D. & H., Oneonta, N. Y. (1957)
Seley, L. L., Mast. Carp., C. B. & Q., Hannibal, Mo. (1953)
Sellers, J. B., Asst. B. & B. Supvr., L. & N., Mobile, Ala. (1957)
Shamblin, R. E., Supvr. B. & B., N. & W., Bluefield, W. Va. (1957)
Sharkey, J. J. (Ret.), Gen. Fore. B. & B., P. R. R., Short Hills, N. J. (1951)
Shepley, S. H., Ch. Engr., E. J. & E., Joliet, Ill. (1945)
Short, W. L., Asst. Engr., M. P., St. Louis, Mo. (1951)
Shryer, L. S., Gen. Fore. B. & B., A. T. & S. F., Winslow, Ariz. (1954)
Siegfried, F. A., For. Carp., Reading, Reading, Pa. (1947)
Simmons, E. R., B. & B. Supvr., St. L. S. W., Pine Bluff, Ark. (1955)
Simmons, R. G., Gen. Rdm., C. M. St. P. & P., Chicago, Ill. (1957)
Simpter, R. U., Asst. Supvr. B. & B., B. & M., Boston, Mass. (1955)
Sinclair, C. H., Asst. Supv. B. & B., C. & N. W., Milwaukee, Wis. (1954)
Skinner, H. E., Supv. Scales & Wk. Equip., E. J. & E., Joliet, Ill. (1944)
Skogreen, J. A., Mast Carp., C. B. & Q., Wymore, Nebr. (1957)
Slagle, G. P., Ch. Carp., C. M. St. P. & P., Milwaukee, Wis. (1948)
Smith, A. P., Asst. Eng., C. & E. I., Danville, Ill. (1956)
Smith, C. A., Supv. B. & B., C. R. & I. and I. H. B., Hammond, Ind. (1946)
Smith, E. L., B. & B. Supv., Southern, Hattiesburg, Miss. (1952)
Smith, H. E., Engr. M. of W., G. H. & H., Galveston, Tex. (1941)
Smith, J., B. & B. Supv., S. P., Sacramento, Calif. (1943)
Smith, L. L., Asst. B. & B. Supv., S. P., Dunsmuir, Calif. (1948)
Smith, N. E., Div. Engr., C. M. St. P. & P., Chicago, Ill. (1951)
Smith, R. H., Jr., Dist. Engr., P. R. R., Chicago, Ill. (1957)
Snavely, A. F., Engr., P. R. R., Fort Wayne, Ind. (1957)
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Spofford, F. R., Asst. Ch. Engr., B. & M., Boston, Mass. (1940)
Sprengel, H. A., Asst. B. & B. Supv., M. P., Falls City, Nebr. (1950)
Stadter, C. O.. Asst. B. & B. Supvr., M. P., Monroe, La. (1955)
Stanczy, W., Detailer, C. M., St. P. & P., Chicago, Ill.. (1957)
Steel, J. V., Engr., Acct., U. T. Co., Dallas, Tex. (1953)
Stephens, B. M., Jr., Asst. to Exec. Vice Pres., So. Pac. Line in Tex. & La., Houston, Texas (1946)
Stevens, C. M., B. & B. Supv., S. P., Portland, Ore. (1950)
Stinebaugh, J. H., Supv. W. S., I. C., Carbondale, Ill. (1951)
Strawhun, G. M., Div. Engr., M. P., Poplar Bluff, Mo. (1955)
Strouss, J. A., Asst. Supv. B. & B., S. P., Sacramento, Calif. (1934)
Sullivan, P., B. & B. Insp., W. P., Elko, Nev. (1957)
Sumner, J., W. S. For., St. L. - S. F., Springfield, Mo. (1948)
Swanson, M., Insp. B. & B., D. T. & I., Dearborn, Mich. (1953)
Sweet, W. A., Gen. For. B. & B., A. T. & S. F., Newton, Kan. (1928)
Switzer, G., Gen. Supv. Str. & Wk. Equip., W. P., Oakland, Calif. (1949)
Switzer, R. E., Gen. For. B. & B. & W. S., G. C. & St. F., Galveston, Tex. (1952)

T

Taggart, C. R., Supv. B. & B., N. Y. C., Indianapolis, Ind. (1935)
Talbot, J. F. H., B. & B. Mast., C. N., Quebec, P. Q., Canada (1957)
Talman, H. S., Gen. Supvr. B. & B., C. & O., Richmond, Va. (1956)
Tanner, R. P., Asst. Div. Eng., C. M. St. P. & P., Butte, Mont. (1955)
Tardy, F. E., Asst. Div. Engr., S. P., Tucson, Ariz. (1953)
Taylor, F. H., Eng. M. of W., F. E. C., St. Augustine, Fla. (1951)
Taylor, W. L., B. & B. Supv., Southern, Jasper, Ala. (1950)
Templin, R. S., For. Carp., Reading, St. Clair, Pa. (1947)
Termunde, W. L., Asst. Rdm., Belt Ry. of C., Chicago, Ill. (1956)
Thelander, P. V., Asst. Ch. Engr., C. & N. W., Chicago, Ill. (1939)
Thomas, O. J., B. & B. Supvr., Sou., Atlanta, Ga. (1957)
Thomason, C. G., Bldg., Insp., M. P., Harlingen, Texas (1956)
Thrasher, H. A., Asst. B. & B. Mast., C. N., Hornepayne, Ont., Canada (1957)
Throckmorton, W. B., Ch. Engr., C. R. I. & P., Chicago, Ill. (1957)
Tieman, L. G., Act. Ch. Drafts, C. & N. W., Chicago, Ill. (1956)
Tilley, E. L., Bridge Insp. I. C., Memphis, Tenn. (1956)
Todd, D. C., Engr. Str., P. R. R., Pittsburgh, Pa. (1942)
Todd, J. N., (Ret.) Supt. Scales & Wk. Equip., Southern, Washington, D. C. (1957)
Toh, J. S., Str. Eng.-Brdg. Dept., M. P., St. Louis, Mo. (1956)
Tomer, H., Water Serv. Fore., B. & O., Bellaire, Ohio (1956)
Tourtellotte, E B., Supvr. B. & B., B. & M., Greenfield, Mass. (1947)
Towle, W. T., Supv. B. & B., N. Y. C. & St. L., Brewster, Ohio (1954)
Tracy, D. E., B. & B. Supvr., S. P., Los Angeles, Calif. (1956)
Trickey, R. E., Supt. B. & B., B. & A., Houlton, Me. (1957)
Trulove, J. D., Sr. Asst. B. & B. Supv., S. P., Ogden, Utah (1945)
Tucker, N. R., Asst. Div. Engr., T. & N. O., Houston, Tex. (1939)
Tunison, H. C., Gen. Mgr., L. & N. E., Bethlehem, Pa. (1946)
Tyckoson, E. G., Asst. Ch. Carp., C. M. St. P. & P., Chicago, Ill. (1954)
Tyckoson, E. G., Jr., Drafts., C. M. St. P. & P., Chicago, Ill. (1955)

V

Van Ness, R. A., Br. Engr. Sys., A. T. & S. F., Chicago, Ill. (1949)
Varker, J. L., Spec. Eng., D. & H., Albany, N. Y. (1936)
Von Behren, G., Asst. Supvr. Str., P. R. R., Baltimore, Md. (1956)
von Sprecken, R. E., Asst. Engr.-M. of W. Dept., F. E. C., St. Augustine, Fla. (1951)
von Sprecken, T. M., Asst. to Ch. Engr., Southern, Washington, D. C. (1938)

W

Wachter, C. E., B. & B. Mast., C. N., Port Arthur, Ont., Canada (1957)
Wagner, W. R., Div. Engr., C. & N. W., Escanaba, Mich. (1957)
Walker, G. P., Supv. B. & B., M. P., Monroe, La. (1929)
Wall, E. G., Div. Engr., G. M. & O., Bloomington, Ill. (1942)
Wall, R., Supv. B. & B., Southern, Selma, Ala. (1948)
Wallace, C. E., Gen. Fore. B. & B. & W. S., St. L.-S. F., Springfield, Mo. (1948)
Wang, A. B., Supv. B. & B., C. I. & L., Lafayette, Ind. (1950)
Ward, W. G., Asst. Supv. B. & B., C. & N. W., West Chicago, Ill. (1952)
Ware, W., Div. Eng., C. R. I. & P., Little Rock, Ark. (1956)
Warfield, H. Jr. (Ret.), Insp. M. of W., P. R. R., New Brunswick, N. J. (1952)
Warfield, W. B., Supvr. Str., P. R. R., Camden, N. J. (1951)
Warren, J. A., B. & B. Insp., M. P., San Antonio, Texas (1955)

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Warrenfells, J. F., Ch. Engr., J. T., Jacksonville, Fla. (1946)
Weatherly, H. E., Div. Eng., T. & N. O., El Paso, Texas (1950)
Weaver, W. R., Ch. Mech. Off. and Ch. Eng., P. & S., Brookville, Pa. (1951)
Webber, G. R., Ch. Carp., C. M. St. P. & P., Spokane, Wash. (1948)
Weeks, A. H., B. & B. Insp., N. Y. C., Watertown, N. Y. (1957)
Welch, J. W., Supv. B. & B., F. E. C., St. Augustine, Fla. (1943)
Weller, R. C., Div. Engr., C. N., Hornepayne, Ont., Canada (1957)
White, J. A., Jr., Asst. Eng. N. S., Norfolk, Va. (1956)
White, L. H., Supvr. B. & B., I. C., New Orleans, La. (1946)
White, S., Gen. B. & B. Supv., S. P., San Francisco, Calif. (1942)
Wiemer, H. C., B. & B. Supvr., N. P., Duluth, Minn. (1957)
Wiitala, A., Gen. For. B. & B., L. S. & I., Marquette, Mich. (1941)
Wiklund, W. W., Asst. Mast. Carp., G. N., Havre, Mont. (1955)
Williams, C., Asst. Supv. B. & B., C. & O., Ashland, Ky. (1950)
Williams, D. R., Brdg. Insp., C. & E. I., Danville, Ill. (1956)
Williams, N. H., Div. Engr., D. & H., Oneonta, N. Y. (1947)
Williams, W. T., B. & B. Supvr., T. & N. O., Ennis, Texas (1956)
Wilson, H. M., Supvr. Str., P. R. R., Chicago, Ill. (1953)
Wilson, R. P., Supv. B. & B., C. & O., Hinton, W. Va. (1948)
Wintoniak, S. G., Engr. Str., P. R. R., Chicago, Ill. (1953)
Wistrich, H. A., Ch. Engr., L. V., Bethlehem, Pa. (1938)
Witherspoon, J. P., Mast. Carp., S. A. L., Savannah, Ga. (1948)
Wold, O. R., B. & B. Supvr., N. P., Spokane, Wash. (1957)
Wood, R. E., Supvr. B. & B., G. N., Great Falls, Mont. (1954)
Woodward, J. D., Supvr. Str., P. R. R., Altoona, Pa. (1952)
Woolford, F. R., Ch. Engr., W. P., San Francisco, Calif. (1950)
Worden, R. K., Gen. Fore. B. & B. & W. S., G. C. & S. F., Ft. Worth, Tex. (1954)
Wray, H. O., Sec. & Ch. Engr., T. C. Term., Texas City, Tex. (1939)
Wrights, H., Supv. B. & B., M. P., Little Rock, Ark. (1929)

Y

Yaw, D. M., Mast. Carp., Erie, Buffalo, N. Y. (1951)
Yewell, J. E., Ch. Engr., B. & L. E., Greenville, Pa. (1941)
Youngblood, R. A., Process Supt., B. & B., C. of G., Savannah, Ga. (1957)

Z

Zapfe, E. J., Asst. Ch. Engr. & Supt. B. & B., G. B. & W., Green Bay, Wis. (1952)
Zettler, F. C., B. & B. Mast., C. P., Schreiber, Ont., Can. (1953)
Zimmerman, C. B., Asst. Arch., Sou., Knoxville, Tenn. (1957)

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Aagaard, P., (Ret.), Supv. Bldgs., I. C., 294 Winthrop Ave., Elmhurst, Ill. 1906
Anderson, R. D., (Ret.), Div. Engr., C. & N. W., Marvin Hughitt Hotel, Huron, S. D. . 1923

B

Batey, W. A., (Ret.), Const. Engr., U. P., 4303 South St., Lincoln Neb. 1918
Benjamin, H. I., (Ret.), Vice Chair. Sys. Com. on Ins., S. P., San Francisco, Calif. 1922
Bost, M. A., (Ret.) Asst. Engr., C. M. St. P. & P., 322 S. Carolina, Mason City, Iowa . . . 1935

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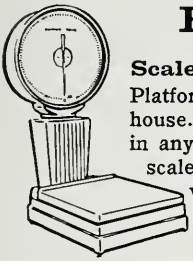

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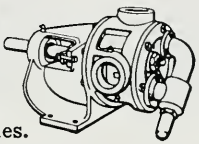

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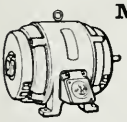

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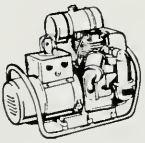

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Christianson, H. B., (Ret.) Sp. Eng., C. M. St. P. & P., Chicago, Ill. . . . 1928
Church, H. M., (Ret.), Gen. Supvr. B. & B., C. & O., 509 No. Blvd., Richmond, Va. . . . 1939
Clark, W. A., (Ret.), Off. Engr., D. M. & I. R., 2718 E. 5th St., Duluth 5, Minn. . . . 1908
Colvin, A. A., (Ret.), Div. Engr., C. & N. W., 1000 Prospect Ave., Norfolk, Nebr. . . . 1937
Cota, G. M., (Ret.), Ch. Clk. Engr. Dept., C. of V., Box 114, St. Albans, Vt. . . . 1913
Cramer, F. H., (Ret.), Brdg. Eng., C. B. & Q., 2739 Agatite Ave., Chicago, Ill. . . . 1927

D

Decker, H. H. (Ret.), Engr. of M., C. & N. W., 2915 Ingersoll Ave., Des Moines, Ia. . . . 1908

E

Engman, V. E., (Ret.), Ch. Carp., C. M. St. P. & P., 3429 - 17th Ave., So., Minneapolis 7, Minn. . . . 1920

G

Garis, L. D., (Ret.), Gen. Br. Insp., C. & N. W., 12 N. Home Ave., Park Ridge, Ill. . . . 1930
Gentis, I., (Ret.), Fore. B. & B., S. P., 2003 West St., Oakland, Calif. . . . 1912
Geyer, C. J., (Ret.), Vice Pres., C. & O., Huntington, W. Va. . . . 1928
Gillette, J. E., (Ret.), Carp. Fore., C. M. St. P. & P., c/o Carp. Fore., C. M. St. P. & P. Mazomanie, Wis. . . . 1923
Gillis, A. D., (Ret.), B. & B. Supvr., N. Y. N. H. & H., c/o B. & B. Supvr., N. Y., N. H. & H., Providence, R. I. . . . 1923
Glander, A. M., (Ret.), Ch. Carp., C. M. St. P. & P., 2008 Lake Shore Dr., Austin, Minn. . . . 1936
Gunderson, E., (Ret.), Supt. B. & B., C. St. P. M. & O., Altoona, Wis. . . . 1927
Guppy, B. W., (Ret.), Engr. Strucs., B. & M., 52 Stratford Rd., Melrose, Mass. . . . 1914

H

Hand, G. W., (Ret.), Asst. to Pres., C. & N. W., 412 Courtland Ave., Park Ridge, Ill. . . . 1909
Harman, W. C., (Ret.), Supv. B. & B., S. P., 656 Cedar St., San Carlos, Calif. . . . 1911
Hartwell, J. R., (Ret.), Supvr. B. & B., C. & N. W., c/o Supvr. B. & B., C. & N. W., Pierre, S. D. . . . 1918
Heiszenbuttel, H., (Ret.), B. & B. Supvr., C. & N. W., 808 So. 3rd St., Norfolk, Neb. . . . 1917
Hemstad, B., (Ret.), Mast. Carp., G. N., 1120 Becker Ave., West, Willmar, Minn. . . . 1937
Heuss, C. W., (Ret.), Supvr. B. & B., C. C. C. & St. L., 1840 Lexington, Indianapolis, Ind. . . . 1919
Hillman, F. W., (Ret.), Asst. Eng. M. of W., C. & N. W., 1452 Oak Ave., Evanston, Ill. . . . 1917
Horning, H. A., (Ret.), Asst. Supt. Br., M. C., 1106 Francis St., Jackson, Mich. . . . 1902
Huckstep, W. A., (Ret.), Gen. Bldg. Supvr., M. P. 3126 E. Linden St., Tucson, Ariz. . . . 1941
Huntsman, F. C., (Ret.), Asst. Eng., Wabash, 7421 Bruno Ave., St. Louis 17, Mo. . . . 1922

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Johnson, M., (Ret.), Prin. Asst. Engr., I. C., c/o Casa de Fresa., Hammond, La. . . . 1915

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Kemmerer, W. G., (Ret.), Eng. B. & B., P. R. R., 508 Rockavon Rd., Narberth, Pa. 1931
Koch, H. L., (Ret.), Supvr. B. & B., N. Y. C. & St. L., 637 Main St., Conneaut, Ohio . . . 1922

L

Lacher, W. S., (Ret.), Secretary, A. R. E. A., 407 E. Fuller Rd., Hinsdale, Ill. 1922
Lampson, W., (Ret.), Supvr. B. & B., M. C., 170 Caleb St., Portland, Me. 1930
Landstrom, C. A., (Ret.), Supvr. B. & B., C. B. & Q., 1311 S. 3rd St., Burlington, Ia. . . 1928
Larsen, H. C., (Ret.), Str. Iron Fore., C. St. P. M. & O., 1084 Sims Ave., St. Paul 6, Minn. 1928
Lincoln, S., (Ret.), Gen. Fore. B. & B., G. C. & S. F., 1903 Harrison Ave., Beaumont, Tex. 1927
Lord, H. T., (Ret.), B. & B. Mast., C. P., 415 Third St., So., Kenora, Ont., Canada . . . 1940

Mc

McKay, A. G., (Ret.), Supvr. B. & B., N. Y., N. H. & H., 11 Pine Island Road, Jupiter Pt. Groton, Conn. 1915
McMahon, T. D., (Ret.), Arch., G. N., 223 Lake Avenue, White Bear Lake 10, Minn. . . . 1918

M

Manley, B. F., (Ret.), Supvr. B. & B., P. E., Los Angeles, Calif. 1916
Masters, F. H., (Ret.), Spec. Engr., E. J. & E., 907 Glenwood Ave., Joliet, Ill. 1920
Mead, E. L., (Ret.), Div. Engr., C. & N. W., 536 N. E. 69th St., Miami, Fla. 1923
Mellgren, J., (Ret.), Fore. W. S., C. & N. W., 523 N. Cadwell Ave., Eagle Grove, Ia. . . . 1913
Merwin, P. B., (Ret.), Asst. Engr., C. & N. W., Rte. 2, Box 565, Washougal, Wash. . . . 1929
Miller, C. E., (Ret.), Asst. Engr. M. of W., C. & N. W., 251 Woodland Rd., Highland Pk., Ill. 1916

N

Nies, A. B. (Ret.), Arch., N.Y.C.System, 408 Third St., Jackson, Mich. 1915

O

O'Brien, W. J., (Ret.), Dist. Carp., C.M.St.P. & P., Juneau County, Necedah, Wis. 1919

P

Parker, W. V., (Ret.), Gen.Fore.B & B., St.L.S.W., 683 Berclair Rd., Memphis 12, Tenn. 1911
Patenaude, E., (Ret.), B. & B. Mast., C. P., 133 John St., Sturgeon Falls, Ont., Can. . . . 1930
Phillips, W. J., (Ret.), Asst. Gen.Br.Insptr.,S.P., 318 Arlington Ave., Berkeley, Calif. . . 1925
Piccone, C., (Ret.), Br. Engr., Nat.Rys. of Mex., Monte Everest 210, Lomas de Chapultepec, Mexico City, Mex. 1923
Pinard, T. W., (Ret.), Ch. Engr., L. I., 9 Broadview Ave., Box 692, Bellport, L. I., N. Y. . 1920

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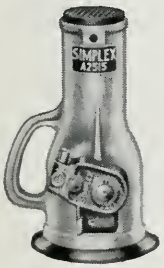

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Rights, H. T., (Ret.), Asst. Br. Engr., L. V., 1015 Raymond Ave., Bethlehem, Pa. 1927
Rintoul, D. T., (Ret.), Gen. Br. Inspr., S. P., 2571 Glen Green, Hollywood 28, Calif. 1910
Roof, W. R., (Ret.), Br. Engr., C. G. W., 7728 So. Yates Ave., Chicago 49, Ill. 1927
Rowland, O. F., (Ret.), Asst. Engr., D. & H., c/o Berkshire Industrial Farm, Canaan, N. Y. 1923

S

Scheetz, F. B., (Ret.), Asst. Engr., M. P., 3930 Connecticut Ave. N.W., Washington, D. C. 1905
Shobert, F., (Ret.), Sys. Steel Const. Fore., S. P., 3745 Linwood Ave., Oakland, Calif. 1918
Singer, E. W., (Ret.), Supvr. B. & B., N. Y. C. & St. L., 6727 3rd Ave. North, St. Petersburg, Fla. 1923
Smith, C. E., (Ret.), Vice Pres., N.Y. N.H. & H., 282 Prospect St., New Haven, Conn. 1911
Swartz, W. G., (Ret.), Eng. Acct., C. N., 1829 SanJuan Ave., R. R. #5, Victoria, B. C., Can. 1917

T

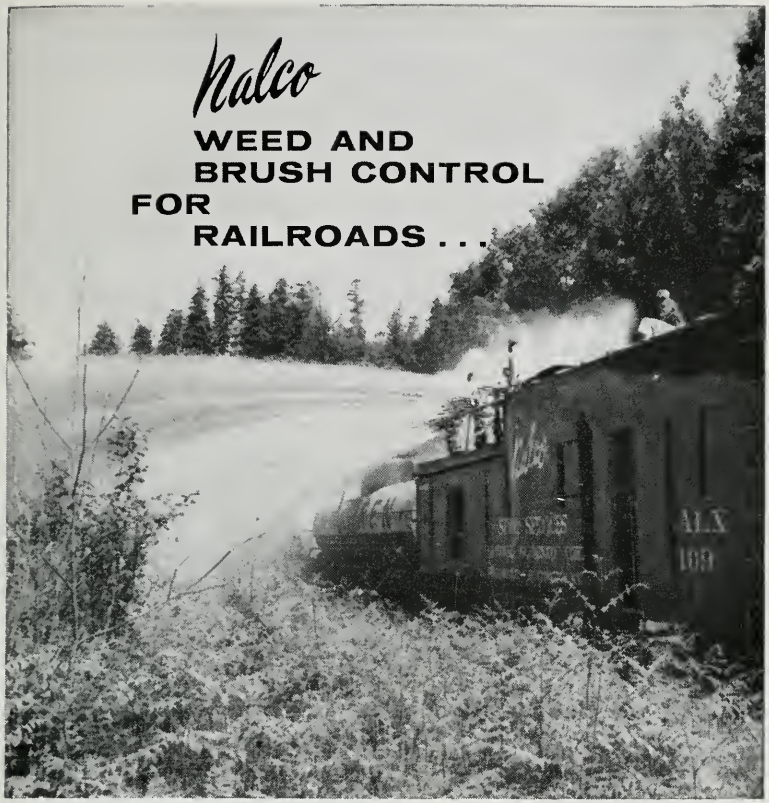
Tattershall, E. R., (Ret.), Supvr. of Mtce. Equip., N.Y.C., 21 Coy St., Malone, N. Y. 1913
Tetrault, L. J., (Ret.) B. & B. Fore., N. Y. N. H. & H., Providence, R. I. 1936

W

Wait, R. E., (Ret.), Supv. B. & B., Wabash, 1638 N. Maple, Decatur, Ill. 1923
Walden, W. H., (Ret.), Rdm., Southern, 1012 Porter St., Richmond 24, Va. 1920
White, W. E., (Ret.), Gen. Fore., A.T.&S.F., 706 W. 6th St., Chanute, Kan. 1920
Whitehouse, B. M., (Ret.), Ch. Fire Insp., C. & N. W., 2008 Isabella St., Evanston, Ill. 1927
Winkelhaus, L. C., (Ret.), Arch. Engr., C. & N. W., 6921 Oriole Ave., Chicago 31, Ill. 1934
Womeldorf, C. F., (Ret.), Div. Engr., C. & N.W., 111 No. 12th St., Norfolk, Nebr. 1917
Wright, C. W., (Ret.), Mast. Carp., L.I., 67 Nassau Pkwy., Oceanside, N. Y. 1908

Z

Zinsmeister, E. C., (Ret.), Mast. Carp., B. & O., 303 - 12th Ave. No., St. Petersburg, Fla. 1905



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Agee, J. L., Mgr.-Steel Bldg. Sls., Armco Drainage & Metal Prod., Inc.
P. O. Box 1699, Houston, Texas 1957
Arnold, W. P., Vice Pres. & Gen. Mgr., (Wood Preserving Div.), Koppers Co. Inc.
Pittsburgh 19, Pa. 1946

B

Baker, D. L., Vice Pres. & Treas., Baker & Hickey Co., P.O. Box 5008, Tri Village
Sta. Columbus 12, Ohio 1946
Bishop, D. B., Dist. Mgr., Dearborn Chemical Co., 2 Gateway Center,
Pittsburgh 22, Pa. 1946
Boot, A. K., Sales, Bethlehem Steel Co., Prudential Bldg., Chicago, Ill. 1956
Borcherding, C. H., Sp. Rep., The Master Builders Co., 2125 Maryland Ave.,
Baltimore, Md. 1947
Boulton, C. R., R. R. Contractor, 10 E. Town St., Columbus 15, Ohio 1946
Brennon, L. D., M. of W. Instr., Air Reduction Sales Co., 620 King Drive,
Pine Lake, Ga. 1950
Brietzke, W. F., Mgr. R. R. Mach., Pettibone Mulliken Corp., 4710 W. Division St.,
Chicago 51, Ill. 1956
Bruce, W. O., Scrap Broker, Luria Bros. & Co., Inc., 2190 Board of Trade Bldg.,
Chicago, Ill. 1955
Bryant, C. E. Jr., Johns-Manville Sls. Corp., 22 E. 40th St., New York, N. Y. 1951
Bugbee, W. E., Sls. Rep. Railway Equipment, 1802 Alamo National Bldg.,
San Antonio 5, Texas 1956
Burpee, C. M., Director, American Wood Preservers Institute,
111 W. Washington St., Chicago 2, Ill. 1930
Burres, W. G., Ry. Rep., Portland Cement Association, 33 W. Grand Ave.,
Chicago 10, Ill. 1956
Buskirk, G. C., Mgr., Ry. Div., U. S. Borax & Chem. Corp., 916 WOW Bldg.,
Omaha 2, Neb. 1949

C

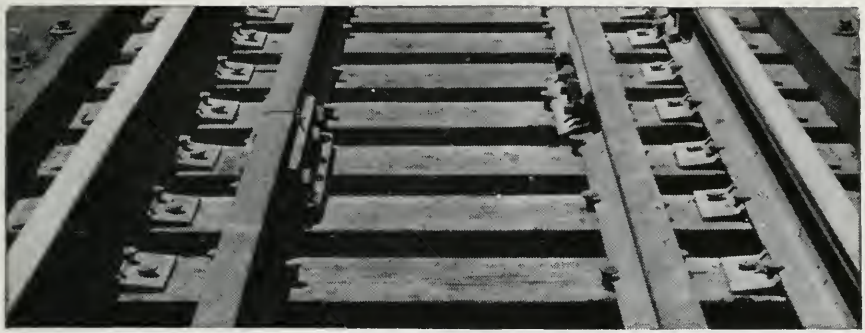
Clapp, K. J., Asst. Sls. Mgr., Homelite Corp., Port Chester, N. Y. 1946
Clark, H., Jr., Mgr. R. R. Sls., Armco Drainage & Metal Products Co.,
20 N. Wacker Dr., Chicago, Ill. 1953
Clarke, R., Res. Mgr., Massey Concrete Products Co., 111 W. Washington St.
Chicago 2, Ill. 1948
Cross, E. T., Vice Pres., Armco Drainage & Metal Prod. Inc., Middletown, Ohio 1946
Cummings, C. P., Asst. Engr., F. Ray Martin Engrs., Inc., 620 Victoria Bldg.,
St. Louis, Mo. 1948

D

Davidson, T., Asst. Mgr., Globe Chemical Company, 80 E. Jackson Blvd., Chicago, Ill. 1955
Davis, V. W., Mgr. RR. Sls., Armco Drainage & Metal Pro. Inc., P. O. Box 1343,
Atlanta, Ga. 1956
Detzel, G. E., Geo. E. Detzel Co., 2303 Gilbert Ave., Cincinnati, Ohio 1945
Deubel, H. R., Mgr. RR. Div., Chicago Pneumatic Tool Co., 936 E. 87th St.,
Chicago 19, Ill. 1956
Duffie, F. J., Serv. Eng., Linde Air Prod. Co., 230 N. Michigan Ave., Chicago 1, Ill. 1946

E

Enstrom, W. A., Mgr. Trk. Mat'ls. Div., Pettibone Mulliken Corp., 4710 W. Division
St., Chicago, Ill. 1956
Evinger, F. W., R. R. Rep., The Leon Co., 3243 Euclid Ave., Apt. #2A, Berwyn, Ill. 1946



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Filkins, A. J., Pres., Filkins & Sons Co., 216 S. Jefferson St., Chicago 6, Ill. . . . 1927
Fix, F., Dist. Sls. Mgr., Transp. Dept., Johns-Manville Sls. Corp., 1530 Guildhall Bldg., Cleveland, Ohio . . . 1946
Flanagan, L. F., Ry. Sls., Detroit Graphite Div., Valspar Corp., 7701 W. 47th St., Lyons, Ill. . . . 1937
Fletcher, R. L., Struct. Engr., Timber Engineering Co., 1319 18th St., N. W., Washington, D. C. . . . 1947
Flinn, L. E., Asst. Vice Pres. RR. Div., Dearborn Chemical Co., 375 Merchandise Mart, Chicago 54, Ill. . . . 1949
Frederick, H. Z., Mgr., Ry. Sls. Div., The R. C. Mahon Co., Detroit 34, Mich. . . . 1950

G

Gibboney, J. L., Vice Pres., Nat'l. Aluminate Corp., 422 No. Dover St., La Grange Park, Ill. . . . 1949
Giles, J. M., Spl. Repr., Off-Track Equip., Caterpillar Tractor Co., Peoria 8, Ill. . . . 1938
Glassgold, I. L., Pres., Masonry Resur. & Con. Co., Inc., B. & O. Coal Pier, Baltimore, Md. . . . 1950
Grego, L. A.,Sls. Engr. RR. Div., Pettibone Mulliken Corp., 141 W. Jackson Blvd., Chicago 4, Ill. . . . 1956

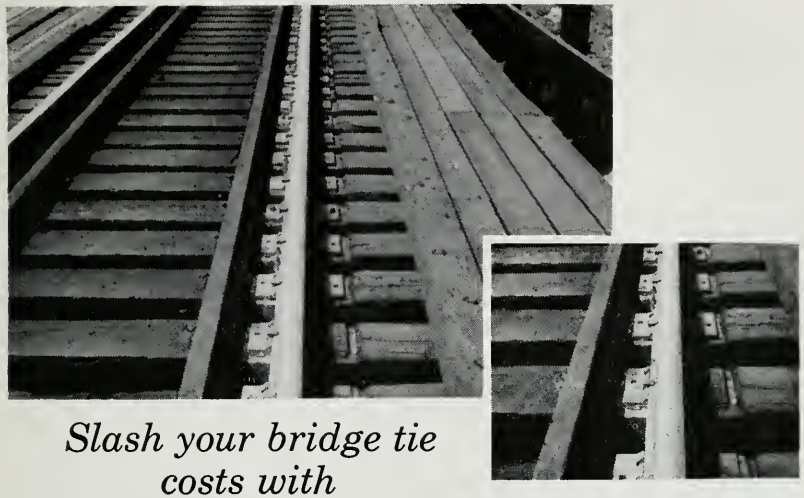
H

Haak, W. A., Industrial Sales, Alban Tractor Co., Inc., 8531 Pulaski Highway, Baltimore 6, Md. . . . 1957
Harding, C. R., Pres., The Pullman Co., 165 N. Canal St., Chicago 6, Ill. . . . 1924
Harrison, T. A., Const. Market Specialist, Armco Steel Corp, Middletown, Ohio . . . 1956
Hickey, J. F., Pres., Baker & Hickey Co., P. O. Box 5008, Tri-Village Sta., Columbus 12, Ohio . . . 1946
Hoelzel, W. N., Gen. Mgr. Sls., Gary Screw & Bolt Div., Pittsburgh Screw & Bolt Corp., 122 So. Michigan Ave., Chicago 3, Ill. . . . 1949
Hofer, P., East Dist. Mgr., Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N. Y. . . . 1956
Hoffman, T. E., Factory Rep., Zone Co., 2502 Wilson St., Falls City, Nebr. . . . 1949
Holderman, H. L., Sls. Repr., Bird & Son, Inc., 203 S. West Ave., Elmhurst, Ill. . . . 1951
Holmberg, V. V., Vice Pres., The Ellington Miller Co., 25 E. Jackson Blvd., Chicago 4, Ill. . . . 1942
Holmes, J. L., Rep., Bird & Son, Inc., 721 Second Ave., West Haven, Conn. . . . 1956
Holstein, F. W., Ry. Supply & Engineering, Hopatcong, N. J. . . . 1948
Hopkins, W. S., Jr., M. of W. Rep., Air Reduction Sls. Co., 150 E. 42nd St., New York, N. Y. . . . 1949

Itter, R. C., Sls. Corresp., Pettibone Mulliken Corp., 4710 W. Division St., Chicago 51, Ill. . . . 1957

J

Jacobson, A. E., Serv. Eng., Linde Air Prod. Co., 230 N. Michigan Ave., Chicago, Ill. . . . 1950
Johnson, I. K., 3958 N. 54th St., Milwaukee, Wis. . . . 1953
Jones, E. L., Sls. Engr., American Crankshaft Co., 510 Morehead St., Charlotte, N. C. . . . 1957
Jones, J. A., Sls. Eng., West Coast Engine & Equip. Co., 1077 East Shore, Berkeley, Calif. . . . 1956



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Kellogg, J., RR. Sls. Rep., National Lead Co., 111 Broadway, New York 6, N. Y. 1956
Kiester, R. S., Dist. Mgr., Pacific Coast Borax Co., 5007 Creekbend, Bellaire, Tex. . . . 1950
Kizak, S. F., Dist. Slsman, National Painting & Oil Co., 5401 S. Laflin St. Chicago, Ill. . 1956

L

Lacey, J. W., Rep. R. R. Dept., Linde Air Products Co., 230 N. Michigan Ave., Chicago 1, Ill. 1946
LeDuc, C. L., Sls. Rep., Republic Powdered Metals, Suite 1310, 109 N. Wabash Ave., Chicago 2, Ill. 1946
Lipscomb, W. P., Mgr. RR. Sls., Armco Drainage & Metal Prod., Inc., P. O. Box 1699, Houston, Texas 1956
Lloyd, F. G., Serv. Engr., Dearborn Chem. Co., Atlanta, Ga. 1957
Lockart, E. P., Sls. Mgr., Insulux Glass Block Div., Kimble Glass Co., P. O. Box 1035-36, Toledo, Ohio 1951
Loeffler, J. S., R. R. Sls. Mgr., Armco Drainage & Metal Prod., Inc., 4345 Lyndale Ave., N., Minneapolis, Minn. 1955
Luther, L. A., Serv. Engr., Ingersoll Rand Co., 1121 Hamilton Ave., Palo Alto Calif. . . . 1945
Lynch, J. K., Res. Mgr., Massey Concrete Prod. Co., Rm. 407-408, Brown Marx Bldg., Birmingham 3, Ala. . . . . .
Lyon, C. A., Reg. Mgr., Master Builders Co., 16420 W. Seven Mile Road, Detroit, Mich. 1945

Mc

McDaniel, W. L., Vice Pres., Massey Concrete Prod. Co., 111 W. Washington St., Chicago 2, Ill. 1945
McMahon, R. D., Sales Engr., Fabreeka Prod. Co., 325 W. Huron St., Chicago, Ill. 1955

M

Mabry, D. B., Mgr. Lmbr. Sls., T. J. Moss Tie Co., 700 Security Bldg., St. Louis, Mo. . . . 1948
Mann, E. A., Pres., Champion Transportation Sls., Inc., 222 W. Adams St., Chicago 6, Ill. 1951
Maurer, S. S., Western Div. Mgr., Fabreeka Prod. Co., 325 W. Huron St., Chicago 10, Ill. 1952
Myers, D. R., Sls. Repr., R. R. Sls., Patterson Sargent Co., 1882 S. Normal Ave., Chicago 16, Ill. 1952

N

Needham, L. H., Pres., The Penetryn System, Inc., 2294 Scranton Rd., Cleveland Ohio . . 1946
Nuckols, L. T., Conslt. Eng., 3316 Gloucester Rd., Richmond 27, Va. 1951

P

Parke, J. R., Salesman, Pacific Coast Borax Co., Wilford Bldg., 33rd & Arch St., Philadelphia, Pa. 1956
Patterson, R., Mgr. of Serv. & Maint., Intrusion Prepakt, Inc., 80 E. Jackson Blvd., Chicago, Ill. 1946
Patton, R. C., Tech. Adviser, Libby Zone Co., 731 E. Kingston Ave., Charlotte, N. C. . . 1952
Phillips, R. O., Asst. to Pres., The Zone Co., Fireplate Div., P. O. Box 789, Fort Worth, Texas 1956

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Richter, R. W., Asst. to Mgr.-Const. Dept., Armco Drainage & Metal Prod. Inc., 3202 W. Sample St., South Bend 21, Ind. 1953
Ruhl, D. A., R. R. Engr., Ordnance Corps, U. S. Army, Joliet, Ill. 1948

S

Schneider, C. A., Pres., Schneider Const. Co., Inc., 3004 W. Dallas Ave., Houston, Texas 1956
Scott, J. M., Sls., The Arco Co., 614 Delaware St., Scranton 9, Pa. 1945
Seyler, A. P., Indus. & R. R. Sls. Div., Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio 1954
Smith, F. C., R. R. Dept., Marsh & McLennan, Inc., 231 S. LaSalle St. Chicago 4, Ill. .. 1948
Smith, Wm. T., Vice Pres., Geo. E. Detzel Co., 2303 Gilbert Ave., Cincinnati 6, Ohio .. 1950
Stierer, G. W., Mgr. Struct'l. Steel Dept., Robt. W. Hunt. Co., 175 W. Jackson Blvd., Chicago 4, Ill. 1946
Stiles, C. C., Vice Pres., The Zone Co., 917 N. Main, Ft. Worth, Texas 1957
Sullivan, J. W., Asst. Sales Mgr., Wood Pres. Div., Koppers Co. Inc., 700 Koppers Bldg., Pittsburgh, Pa. 1955
Swallow, O., Pres., Utilities Div., The Zone Co., P. O. Box 789, Ft. Worth, Texas 1956

T

Thoresen, H. B., Sales, Globe Chemical Co., 80 E. Jackson Blvd., Chicago, Ill. 1955
Truss, F. W., Mgr., RR. Sales, Armco Drainage & Metal Prod. Inc., 10 S. Brentwood Blvd., Clayton 5, Mo. 1946
Twomey, J. F., Vice Pres., McCracken Contracting Co., 7340 S. Western Ave., Chicago, Ill. 1956

U

Utley, O. H., Vice Pres., The Zone Co. A Div. - Southwestern Pet. Co., 917 N. Main St., Ft. Worth, Texas 1949

V

Van Wolf, A. F., Gen. Mgr., General Concrete Restoration Corp., 330 S. Dearborn St., Chicago, Ill. 1955
Von Kampen, K., Ch. Eng., Pettibone Mulliken Corp., 4710 W. Division St., Chicago 51, Ill. 1956

W

Walters, W. R., 1535 Rand Tower, Minneapolis, Minn. 1949
Weiss, W. E., Sls. Eng., Pettibone Mulliken Corp., 4710 W. Division St., Chicago 51, Ill. 1956
Wicker, W. S., Ch. Engr., Transportation Mutual Insurance Co., 150-10th Street, N.E., Atlanta 5, Ga. 1953
Wilhite, D. L., Sales, U. S. Borax & Chem. Corp., 4009 Cornado Pl., Oklahoma City, Okla. 1957
Williams, C. B., Pres., Ever Tight Bolt Assembly Co., 238 Lincoln Ave., Council Bluffs, Ia. 1954
Williams, G. S., Supt., Southern Amiesite Asphalt Co., Inc., 3401 5th Ave. No., Birmingham, Ala. 1956
Wingerson, C., Ry. Sls. Engr., Pittsburgh Screw & Bolt Corp., P. O. Box 1708, Pittsburgh 30, Pa. 1954

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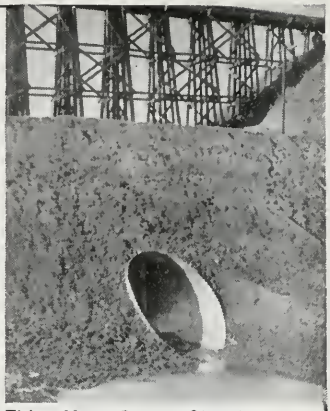

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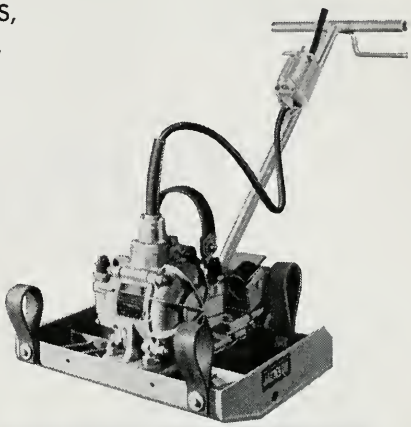

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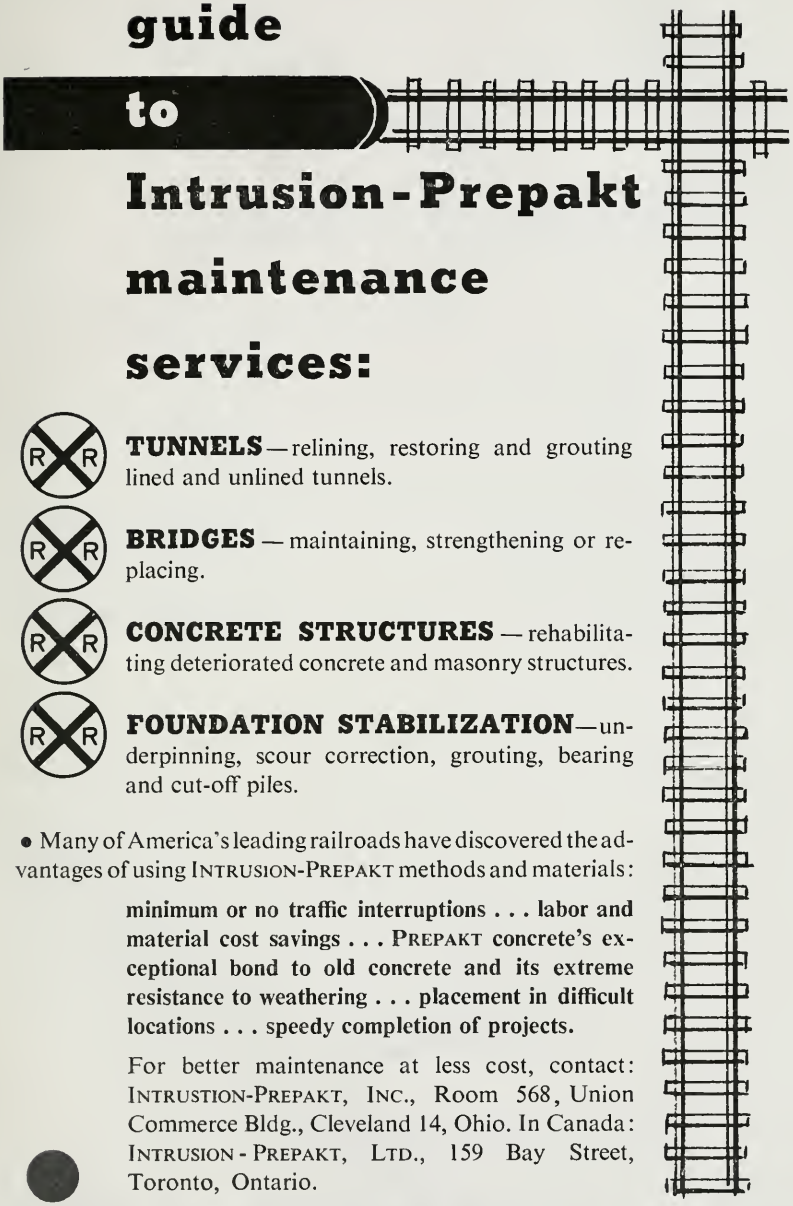

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Schmidl, R. M., Editor, Railway Purchases & Stores, Chicago 6, Ill.

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No.	Place of Meeting	Date	Membership
1	St. Louis, Mo.	Sept. 25, 1891	60
2	Cincinnati, Ohio	Oct. 18-19, 1892	112
3	Philadelphia, Pa.	Oct. 17-19, 1893	128
4	Kansas City, Mo.	Oct. 16-18, 1894	115
5	New Orleans, La.	Oct. 15-16, 1895	122
6	Chicago, Ill.	Oct. 20-22, 1896	140
7	Denver, Colo.	Oct. 19-21, 1897	127
8	Richmond, Va.	Oct. 18-19, 1898	148
9	Detroit, Mich.	Oct. 17-19, 1899	148
10	St. Louis, Mo.	Oct. 16-18, 1900	143
11	Atlanta, Ga.	Oct. 15-17, 1901	171
12	Minneapolis, Minn.	Oct. 21-23, 1902	195
13	Quebec, Canada	Oct. 20-22, 1903	223
14	Chicago, Ill.	Oct. 18-20, 1904	293
15	Pittsburgh, Pa.	Oct. 17-19, 1905	313
16	Boston, Mass.	Oct. 16-18, 1906	340
17	Milwaukee, Wis.	Oct. 15-17, 1907	341
18	Washington, D. C.	Oct. 20-22, 1908	368
19	Jacksonville, Fla.	Oct. 19-21, 1909	393
20	Denver, Colo.	Oct. 18-20, 1910	428
21	St. Louis, Mo.	Oct. 17-19, 1911	499
22	Baltimore, Md.	Oct. 15-17, 1912	524
23	Montreal, Quebec	Oct. 21-23, 1913	570
24	Los Angeles, Cal.	Oct. 20-22, 1914	586
25	Detroit, Mich.	Oct. 19-21, 1915	665
26	New Orleans, La.	Oct. 17-19, 1916	710
27	Chicago, Ill.	Oct. 16-18, 1917	704
28	Chicago, Ill.	Oct. 15-17, 1918	716
29	Cleveland, Ohio	Oct. 21-23, 1919	776
30	Atlanta, Ga.	Oct. 26-28, 1920	840
31	New York, N.Y.	Oct. 18-20, 1921	850
32	Cincinnati, Ohio	Oct. 17-19, 1922	865
33	Seattle, Wash.	Oct. 16-18, 1923	846
34	Kansas City, Mo.	Oct. 21-23, 1924	837
35	Buffalo, N.Y.	Oct. 20-22, 1925	759
36	Richmond, Va.	Oct. 12-14, 1926	750
37	Minneapolis, Minn.	Oct. 18-20, 1927	754
38	Boston, Mass.	Oct. 23-25, 1928	755
39	New Orleans, La.	Oct. 15-17, 1929	755
40	Louisville, Ky.	Oct. 21-23, 1930	713
41	Chicago, Ill.	Oct. 16-18, 1934	592
42	Chicago, Ill.	Oct. 15-17, 1935	547
43	Chicago, Ill.	Oct. 20-22, 1936	588
44	Chicago, Ill.	Oct. 19-21, 1937	566
45	Chicago, Ill.	Oct. 18-20, 1938	589
46	Chicago, Ill.	Oct. 17-19, 1939	546
47	Chicago, Ill.	Oct. 15-17, 1940	610
48	Chicago, Ill.	Oct. 14-16, 1941	594
49	Chicago, Ill.	Oct. 20-22, 1942	618
50	Chicago, Ill.	Oct. 20-21, 1943	597
51	Chicago, Ill.	Sept. 17-19, 1946	698
52	Chicago, Ill.	Sept. 16-18, 1947	651
53	Chicago, Ill.	Sept. 20-22, 1948	652
54	Chicago, Ill.	Sept. 12-14, 1949	676
55	Chicago, Ill.	Sept. 18-20, 1950	713
56	Chicago, Ill.	Sept. 17-19, 1951	676
57	Chicago, Ill.	Sept. 15-17, 1952	667
58	Chicago, Ill.	Sept. 15-17, 1953	666
59	Chicago, Ill.	Sept. 13-15, 1954	682
60	Chicago, Ill.	Sept. 19-21, 1955	625
61	Chicago, Ill.	Sept. 18-20, 1956	657
62	Chicago, Ill.	Sept. 23-25, 1957	769

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